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Technology Assimilation:
Understanding The User - IT Professional Relationship

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ABSTRACT

It is argued that a substantial gulf exists between the investment made in technology and the ability of organisations to realise significant improvements in business performance.

In the fields of Innovation and Technology Transfer there have been developments in the application of more process focused and human elements as a way of addressing the deficiencies of the previous generation of linear and more structured research.

In this thesis the conceptual models from such research have been adapted and modified in order to apply it to the specific problem of the adoption and assimilation of information technology (IT). The conceptual models are operationalised through a set of research activities which include investigation into the congruence between technology deliverers and recipients, the technocratic nature of the IT professional role (as determined by employers), the values and perceptions of IT managers, the preoccupation of the IT research and practitioner literature, and the values and perceptions of IT users, as 'service' clients.

The substantive conclusions are that the nature of the role of IT professionals is dominated by relatively project orientated and technology orientated characteristics. This, in part, inhibits the ability of organisations to develop strategy and for organisations to consider the service function of IT. This is displayed in the form of an interactive, conceptual model. The thesis also demonstrates the extent to which the distinction between the adoption of an IT technological opportunity, by an organisation, can be usefully distinguished from the problems of assimilating that opportunity into the daily routine of the organisation and therefore for business advantage.

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"Success is a journey, not a destination"

E. Swedenborg (1688 - 1772)

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CHAPTER ONE

Research Overview and Problem Context

1.1 Introduction

1.1.1 Background

The last decade has seen an unparalleled increase in the use of information technology (IT) within organisations. The expansion of computing, fuelled by the personal computer (PC), has radically altered the way organisations work. However, this has been accompanied by rising technological costs. Over 1.7 million PCs were sold in the UK in 1993, representing a total value of £1.5 billion and an increase of 25% over the previous year (Mintel, 1994). This was mirrored by similar increases in the software market (see Appendix A for full details). More importantly, investment in IT represents between 2% and 4% of the average organisation's entire turnover (Willcocks, 1992 and Mintel, 1994, *respectively*). Hand in hand with the dramatic increases in the availability of the technology is the rapid diffusion of IT to the majority of organisational members. Many white collar activities can no longer function without some form of interaction with IT. The last decade has also seen a change in the application of IT within organisations. The ability to manipulate critical management information has stimulated a progression from applying IT to automate work, to applying it to enhance decision making activities. This has the potential to alter the very nature of work activities.

Few in business would dispute that information technology is essential. However, many see their use of IT as a necessary and costly requirement for business survival, rather than a means of unleashing the untapped competitive advantage of their company. Indeed, it is argued that a gulf exists between the investment made in information technology and organisations' ability to reap significant business benefit from it (Alberthal, 1992). Accordingly, the various changes taking place have made the management of the technology a critical concern. This concern is manifest in the inability to justify IT expenditure, a lack of integration between the technology and business needs, and a plethora of problems associated with managing the operations of the technical functions responsible for IT (discussed in full in Chapter 2). Eccles (1991) maintains that an over-emphasis on short-term, financial performance measures undermines the real business performance improvements which arise from business innovation through technology. These may be found in, for example, improved product and process quality, enhanced information flows, and greater customer satisfaction. Although connecting IT and Business is widely talked about in the management literature, there is a dearth of practical and theoretical advice on this should be brought about and managed. Notable exceptions to this are Burn (1993), Galliers et al. (1994) and Currie (1994). Little recognition of the situation is apparent amongst senior managers and many IT directors are keen only to pay the problem lip-service. The ability to develop new technology would appear to have outstripped the ability to apply it to suitable business scenarios. This implies that the over-emphasis on the technological components has kept organisations from recognising and developing the human elements. As Symonds states:

> *"Information systems themselves are complex social objects inseparable from the organisational context within which they are situated and the infrastructure supporting them, and are products of history and human agency. Work on IS therefore necessitates an interactionist approach, taking the effects of information technology to be a product of neither the technical nor social aspects alone, but of their interaction"* (Symonds, 1990)

By neglecting to address the needs of the technology users, organisations are failing to realise the full potential of their IT resources. A major obstacle to improving this situation is that most organisations tend to approach the management of technology from a technological perspective. This practice causes organisations to become pre-occupied with the technical elements at a cost to the human elements of technology adoption and assimilation.

When due consideration is given to the current situation in many organisations, the need to understand the relationship between those using the technology and those responsible for supporting and administering it becomes more intense. This relationship is central to the transformation from technological innovation to business application, especially if significant improvements in business performance are to be realised. The purpose of this study is to explore aspects of this relationship, so as to further our understanding of the process of technological change, in particular how technology users *assimilate* the technology into their job functions.

1.1.2 Overview of Chapter 1

In order to understand and "interpret" the influence which technology may have in an organisational setting it is first necessary to discuss current thinking concerning technological change (section 1.2). Then, in section 1.3, to see how this thinking is manifest in models of the innovation process. This section also suggests ways for this thesis to address some of the weaknesses found in current innovation research. These include a 'set' of conceptual devices which are drawn from the fields of innovation and technology transfer. Section 1.4 will demonstrate how this thinking is applicable to the development of information technologies, as a specific case of technological change, and alternative approaches to research in this area are suggested. Section 1.5 illustrates the main parameters of this thesis which guide the later research activities. Section 1.6 outlines the contribution of the thesis to the area of study. An overview of the whole thesis is offered in section 1.7.

1.2 The Context of Technological Change

Technological Determinism

The traditional view of the relationship between technology and society is one of a simple cause and effect.

> *"Technological change seems to have its own logic, which we may perhaps protest about or even try to block, but which we appear to be unable to alter fundamentally"* (McKenzie & Wajcman, 1985).

Technology is seen as an independent factor and that changes in technology will, in turn, cause social and organisational changes. This view, known as technological determinism, sees society as passive, only able to respond or adapt to the *impacts* of technical change with little or no scope to influence its course of development. Furthermore, 'the technologists who produce new technology are in this view indeed members of society, but their activity is in an important sense independent of their membership of society' (McKenzie & Wajcman, 1985).

However, the argument which attempts to reinforce technological determinism, namely that technical change can be viewed as external to society, is flawed.

Other Perceived Influences on Technology and Innovation

It is interesting to point out that, in the vast majority of cases, no society is forced to adopt a particular innovation or technology. Ideas of *being forced* only arise when viewed from a social or economic standpoint, not a technological one. Additionally, the same technology can have different effects in various situations. Differing groups have the ability to interpret or exploit the same technology in markedly different ways.

Both these scenarios tend to result from other influences on the innovation process; chiefly, the economic and social characteristics of a particular society or sub-grouping. It is essential to describe these influences in general terms in order to show their relevance to technology adoption and assimilation and to develop the argument, more specifically, with respect to information technology (in part 1.4 below).

Economic and Social Influences

Technical development does not occur in a haphazard manner, rather it is steered and channelled by the needs and goals of either society 'at large' or some subset of a society, say a particular business concern. These goals may be economically driven or the result of societal considerations.

Technology is interwoven with economic factors in several ways. Technological change inevitably incurs a financial cost. These costs are associated with a technology at each stage of the process, from innovation and development through to the costs associated with its implementation. Frequently, this is offset against the economic benefits which may arise from using a technology. Technical change is often justified in that it either reduces the costs or increases the revenue associated with a particular operation or process. Indeed, much innovation is sponsored and justified on the grounds that it saves labour costs or leads to greater efficiency and productivity.

It is important to note that the economic criteria discussed are indirectly influenced by societal factors in that a society, from macro to micro level, is responsible for establishing a set of values which shape the economic framework in which innovation takes place.

"The characteristics of a society play a major part in deciding which technologies are adopted." (McKenzie & Wajcman, 1985)

By contrast, society may play a more blatant and direct role by fostering or inhibiting particular technologies to serve a social aim (Hetman, 1973). The strategic and power aims of certain organisations are satisfied through the use of certain technologies, for example, which allow for labour control by using that technology to de-skill a workforce (McLoughlin & Clark, 1988; Braverman, 1974). Further to this technology may have political[1] effects in that power embodied in a technology will effect and influence the purpose and nature of its application. Linstone (1984) cites numerous historical examples of where different technologies are assessed from a purely technical perspective and demonstrates how socially oriented criteria (relating to the characteristics of specific organisations and/or individuals) result in alternative developments and applications of each technology. Leavitt (1965) recognises that change within organisations arises from the combination and interaction of structure, tasks and people, in addition to technology. Likewise, Scarbrough and Corbett (1992) examine how organisations shape the technology process at the same time as it shapes them. In each case the technological selection decision process is rendered substantially different by the inputs of socially focused goals and aims.

This discussion suggests that technology, of any hue, can hardly be seen as an independent factor. The merits of a particular technology are seen in the light of economic and social considerations, and not the properties of the technology alone.

1.3 The Development of Models of the Innovation Process

The Development Of Linear Models

The earliest attempts to model technological innovation saw the process as a linear relationship. The germ of an innovation lay with scientific discovery, passing through research and development, manufacturing activities and arriving at an end-state with a new product or process. The essence of this perspective is the notion that innovation was driven by scientists and their 'explorations' at the frontiers of science. This 'technology-push' model lay at the centre of thinking until the late 1960's when a series of different studies were conducted, most notably Myers and Marquis (1969), which focused on the importance of the marketplace in the innovation process. This

[1] This is usually politics with a small 'p'.

gave rise to the 'Market Pull' model of innovation. 'In this case innovations are deemed to arise as the result of a perceived and sometimes clearly articulated customer need, resulting in closely focused R&D activity leading to a stream of new products into the market' (Rothwell, 1992). Under this scenario, both scientific research and R&D are purely reactive functions in the innovation process.

The technology-push and market or need-pull models of innovation were increasingly considered to be 'over simplified, extreme and atypical examples of a more general process of coupling between science, technology and the marketplace' (Rothwell). As a result, numerous models of the innovation process have been suggested based on varying attempts to reconcile the original linear arguments.

The weakness of such linear models is that they fail adequately to explain the innovation process. Essentially, they provide an over simplification, which whilst it may be applicable to a few cases does not satisfy the majority. In addition, linear models intrinsically ignore social, organisational and individual aspects which are believed to influence innovation.

> *"The demise of the linear model implies the need to make choices in science and to manage the whole innovation process. The demise of linear thinking should be a welcome challenge to the collective imagination. For the linear model was, at its heart, a determinist scheme"* (Turney, 1991).

However, the linear model is still prevalent today. For example, Turney (1991) mentions its continued use in UK science policy making and Quintas et al. (1992) discuss it as inherent in the development of science parks. More widely, Gattiker (1990) discusses the linear approach with respect to technology-induced organisational change.

The Contemporary Debate

The current debate focuses on the consideration of innovation as a parallel process, rather than as a sequential process as embodied in the more traditional models. The result has been the development of an 'integrated model' which places emphasis on the integration of the different components of the innovation process. The model highlights what it sees as the necessary collaboration and linkages between R&D,

manufacturing, marketing functions and suppliers. Rothwell (1992a) describes this model as 'a close approximation to actual global best practice'. Current research is concentrated on the study of the strategic integration between collaborators. This includes the consideration of, what Rothwell (1992b) calls the fifth Generation innovation process, e.g. the *electronification of innovation* through the use of expert systems, simulation techniques and CAD systems to facilitate co-development of new products.

Issues Arising From This Debate

The contemporary debate on the innovation process has recognised many of the current problems. It has identified the naive approach of the linear model and attempted to assess the ways in which parties involved with the innovation process interact. Despite this recognition much of the literature attempts to define solutions again from a technical perspective. As previously mentioned, Rothwell (1992a) focuses on networks, expert systems and the fifth generation. Further weaknesses of the contemporary debate have been discussed by Seaton and Cordey-Hayes (1993) and include:

i) The inability to address issues of a social, organisational and/or user nature. Current approaches fail to consider the attributes of the organisation which influence the adoption and assimilation of technology. This is manifest by the tendency to solve such problems from a technical perspective, by providing only a technical solution.

ii) The failure of current approaches to recognise the processes of interaction which take place between the various parties involved in the transfer and adoption of technology. Furthermore, they fail to understand the importance of the interaction process in generating real (and successful) organisational benefits.

iii) The inability of the organisation to perceive and articulate its requirements in a technical way, and the apparent incapability of technology professionals to 'pace' themselves to organisational needs, fuels the incongruence between the technology and the business need (Adler et al., 1992, *cf.* chapter 2 of this thesis).

At the heart of this debate is the notion that innovation can be implicitly explained in terms of *critical factors*, the adoption of a variance approach. Quite simply, this suggests that once the critical factors have been identified, the necessary action can be taken and that this action will be sufficient to produce a desired outcome. In addition, the outcome will invariably occur when necessary and sufficient conditions are present. By contrast, Seaton and Cordey-Hayes (1993) propose a more process oriented approach. This implies that:

> *"innovation seldom involves a simple one-off transaction but is a process or dialogue between a variety of actors in the two parties and involves a continuing relationship to the point where real benefit accrues to the recipient"* (Seaton & Cordey-Hayes, 1993).

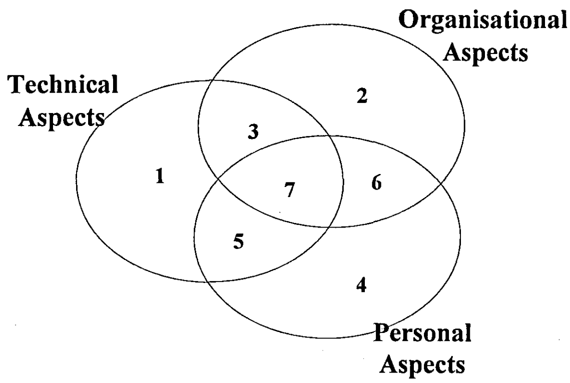
They emphasise the need to view the adoption of technology as a process. However, the use of such an approach is currently limited to providing a conceptual framework to enable debate; no more. Attempts at process models have a tendency to be conceptual rather than theoretical.

This thesis makes use of a number of conceptual devices, from the fields of Innovation and Technology Transfer, in order to facilitate enquiry into the issues raised above, and adapts these to application in the field of IT in Section 1.4.

Multiple Perspectives, Congruence and Service Delivery

It has been observed that the technical aspects of technology assessment overlap with both organisational and individual perspectives (Linstone, 1981; Seaton & Cordey-Hayes, 1992 *above*).

Multiple perspectives has been described as a 'holistic thinking process' used to communicate and evaluate different perspectives and was developed as a framework for addressing a variety of technology assessment and socio-technical scenarios where, it was believed, that simply addressing technological concerns was not appropriate on its own (Linstone et al., 1981; Linstone, 1984). The value of multiple perspectives would appear to lie in the formulation of problems and is, therefore, more appropriate to an organisational, rather than technological assessment. It also allows for a recognition of the dynamic nature of technology adoption. Figure 1.1 illustrates how the technical perspective alone is not adequate to describe the process of technology adoption and assimilation. This is examined in greater depth, and with specific reference to IT innovation, in section 2.3.3.



1: Technology
2: Organisational Actors
3: Socio-Technical Setting
4: Individual Actors
5: Techno-Personal Setting
6: Political Activity
7: Decisions

Figure 1.1 - Outline of the Concept of Multiple Perspectives

Using a derivation of Linstone's work, Holden (1991) employs multiple perspectives as a 'meta-enquiry system' which serves as a basis for a more balanced interpretation of problems and their settings. It is believed that such an approach is suitable to this thesis if we are to understand how organisational and user attributes influence the adoption and assimilation of technology. Indeed, the concept of multiple perspectives permeates the way the research is undertaken (see for example the collation in Section 9.2)

As was previously stated, the relationship between technology professionals and technology users is perceived as crucial to the process of IT innovation. With this in mind, the concept of *congruence* (Nadler & Tushman, 1988) is believed to be beneficial in addressing the issues and complementary to the use of multiple perspectives. The idea of congruence is used in this thesis to address the degree of consistency between the perceptions of various parties, seen as central to the adoption and assimilation of technology.

Through the use of multiple perspectives and congruence this thesis is able to study the human, as well as technical, elements of technology adoption. A further device believed to be appropriate to this human-centred focus is the concept of service delivery. With its origins in logistics (Valleley, 1986) service delivery recognises that technological innovation is the product of a set of social processes, rather than merely a technical artefact. This distinction between intangible (human related) and tangible (technology related) elements is a useful one and is developed in Section 2.6. Its application to IT (as a particular case of technology) has been suggested by Rands (1992) and Watson et al. (1993).

Concepts of Adoption and Assimilation

Following on from Seaton and Cordey-Hayes (1992), Trott (1993) develops the "4A's" conceptual framework of innovation. With respect to the acquisition of production technologies, this sees the inward technology transfer process as comprising four stages: awareness, association, assimilation and application. These are defined as follows:

> *"Awareness describes the process by which an organisation scans for and discovers what information on technology is available; Association describes the processes by which an organisation recognises the value of this technology (ideas) for the organisation; Assimilation describes the processes by which the organisation communicates these ideas* [internally] *and creates genuine business opportunities; and Application describes the processes by which the organisation applies this technology for competitive advantage"* (Trott, 1993).

Furthermore, it is stated that, in order for an organisation to raise its capability for innovation, the individuals within that organisation require these certain capabilities. This conceptualisation is useful because it recognises the importance of prior related knowledge, the interaction between individuals, the nature of communication between different organisational functions and the importance of the context in which innovation takes place. In a similar development, Cohen and Leventhal (1990) refer to 'Absorptive Capacity'; the innovative capability of an organisation, borne out of its ability to exploit the cumulative knowledge of its individual members.

How adoption and assimilation are used in this thesis is that adoption is typically taken to reflect the object of the majority of IT research, in as much as it focuses on a viable or satisfactory IT system. Consequently, adoption describes the initial processes of identifying, then implementing an IT innovation. This encompasses the organisational *acquisition* of particular information technologies, which usually have their origins beyond the organisational boundaries. Assimilation describes the processes of IT innovation following the process of adoption, and which are believed to be necessary for the organisation to realise significant benefit from its investment. If such a distinction is made, then assimilation can be seen as the receptivity of the individual actors, i.e. their ability and willingness to apply IT. The degree of assimilation encompasses the level to which both the individual and the organisation, as a whole, *absorb* the technology into their work tasks and roles. This should be seen as a process of change and forms an intrinsic part of the cumulative (on-going) development of an individual. This represents more of a learning activity, rather than a specification of task change.

1.4 Technological Change: Approaches to Information Technology

The increasing rate of technological change, particularly information technologies, has pushed the management of technology to the forefront. However, there is significant evidence that IT is still managed from a linear, technology push perspective which adheres to a more widespread deterministic perception of technology.

The adoption of IT by organisations is seen to result from the rapidity of computer industry generated change. Change is stimulated by successive waves of manufacturer and vendor promoted technologies. Accordingly, business culture has become oriented towards finding the quick technological fix (Winfield, 1991). For example, the development of expert systems has been recognised as relying on 'technology push' (Goel, 1994) or technical hype (Holden, 1991).

The technical orientation of IT professionals has been highlighted in a number of studies (*most recently* Noble & Newman, 1993; Kumar & Bjorn-Andersen, 1990). McCready & Boone (1992) state that the most frequent problem with computing at executive level is that it is usually technology-driven rather than business driven. The training of IT professionals promotes a deterministic view of technology which has become embodied in the systems analysis and design methodologies used. Finally, economic approaches to assessing the worth of IT to an organisation focus attention on the short-term costs of the technology, rather than the long-term implications for the business.

What is apparent from current approaches to IT management is the failure to understand the other issues which influence the adoption of IT, apart from just the technology. Dutton (1981) discusses the lack of understanding of the rejection of innovations, particularly computer-based systems. The result of this study suggests that the political environment of organisations can be critical to understanding the innovation process. Furthermore, Dutton attempts to understand differences between the macro and micro political environment and their relative influences. Tarr (1991) recognises the problem of using a single perspective and prescribes the use of a 'technology integration model' as an attempt to address other perspectives. Most recently, Quintas (1994a, 1994b) has demonstrated the social, cultural and institutional factors that inhibit the technology transfer process with respect to software engineering technologies.

The linear approach to the management of IT fosters a belief that the process of innovation ends with the 'finished' product. Accordingly, the organisation is seen as a passive customer or recipient. Once organisational perspectives are considered there is the realisation that much of the innovation process takes place long after suppliers, manufacturers and many IT professionals believe it has finished. Much of this innovative activity is concerned with the application of information technologies to specific organisational aims, whether 'sponsored' by sub-unit or individual. Hence, the relationship between the IT professionals, as gatekeeper and filter for IT, and the users, as vital contributors to the innovation process becomes crucial.

In the main, research into the organisational effects of IT is dominated by a variance or factor approach. A major weakness with this is that factor models do not explain <u>how</u> outcomes occur, rather they associate a level of outcome (output) with a level of predictor (input), inferring the causal linkages between the two (see figure 1.2). A frequent conclusion from factor research is that relatively little variance in successful adoption of IT can be accounted for by the factors commonly thought to predict those outcomes (Newman & Robey, 1992; Tait & Vessey, 1988). Furthermore, factor models offer no practical advice on how to manage the process of adoption to produce positive outcomes.

Consequently, current research only offers a structural rather than process approach to the study of IT adoption and assimilation. In their seminal paper, Markus and Robey (1988) provide an in-depth exploration of the theories that have been advanced to explain how and why IT influences organisations. They demonstrate the weaknesses of both technological and organisational imperatives and suggest that process models provide a useful way of understanding the 'dynamic interplay among actors, context and technology', which they term the emergent perspective. In essence, the difference between the variance and process approaches is that variance models search for factors that are seen as necessary and sufficient conditions for an outcome to occur.

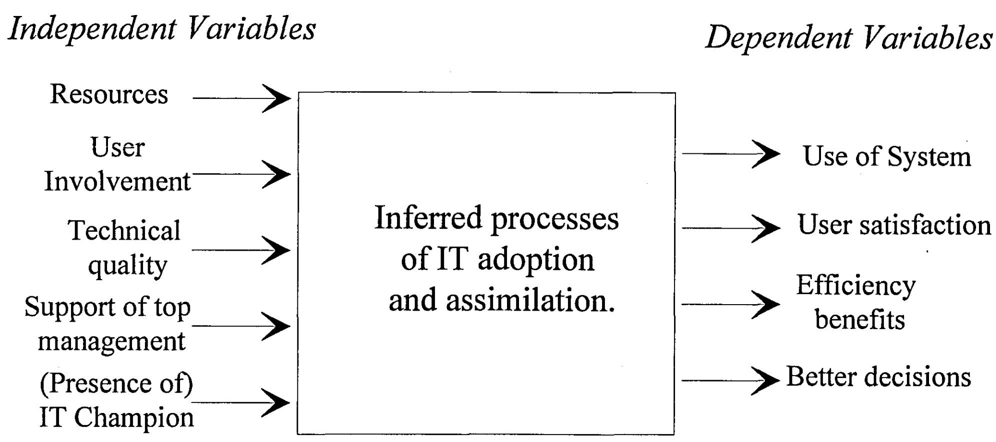


Figure 1.2 - Factor Model of IT Adoption and Assimilation[2]

By contrast, process models aim to identify conditions that are seen as necessary but insufficient to cause an outcome. Fundamental to process models is an understanding of how these necessary conditions are combined, as a sequence of events, which forward an explanation of how a discrete outcome occurs, whenever it does occur. Whilst the process approach has lower expectations about accounting for variance, they do allow research to focus on the dynamics of social change explaining how and why results occur.

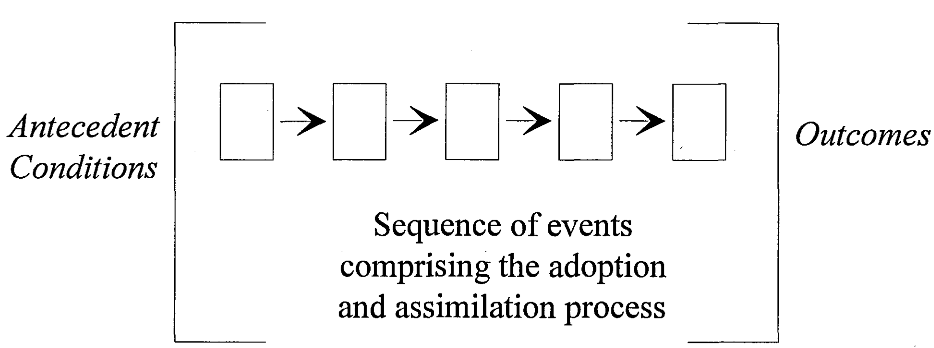


Figure 1.3 -Process Model of IT Adoption and Assimilation

Few studies of IT adoption by organisations have clearly focused on understanding the processes which may transform an initial set of conditions into outcomes. An

[2] adapted from Newman & Robey (1992)

important exception to this is Newman and Robey's (1988) process model of user-analyst relationships during information systems design. The basic process model is presented in figure 1.3. It varies markedly from the factor model in figure 1.2 in that it attempts to understand the encounters and episodes which take place over time. However, Newman and Robey are keen to point out that process and variance approaches should be seen as complementary. Their research stresses the importance of the various encounters between the different actors involved and how the changing nature of this relationship influences the path of IT adoption and assimilation, often quite independently of initial conditions. They conclude that:

> *"The process model does suggest that great attention should be paid to individual encounters between analysts and users. Studying the process clearly shows that the quality of these encounters can significantly affect the users' views of a project whether they accept or reject the claims put by systems personnel. The process is capable of taking different directions under different circumstances"* (Newman and Robey, 1992)

The observations above suggest the need to analyse the organisational processes and dynamics which are responsible for IT adoption and assimilation. Of particular interest are the values and perceptions which various actors bring to this process. Consequently, a process approach is believed to be more applicable to a study of this nature than traditional structural approaches.

1.5 Research Perspective: Bounding the Research.

The purpose of this research is to gain insights into the relationship between technology professionals and technology users. Specifically, the research is concerned with the congruences and incongruences between the *values*, *beliefs* and *perceptions* of a management and technological function within an organisation and user functions. Congruence is defined as:

> *"the degree to which the needs, demands, goals, objectives and/or structures of one component are consistent with the needs, demands, goals, objectives, and/or structures of another component"* (Nadler & Tushman, 1988)

The particular area of focus is within the information technologies as an interesting example to explain. It is expected that the research in itself would be a useful insight into other, more general, technology management concerns.

It is important to establish a suitable boundary for the research to operate in successfully. However, in order to bound the problem it is necessary to define it in such a way that it conflicts with the exploratory nature of this thesis. Nevertheless, it is possible to impose certain criteria for guiding the study. Accordingly, this thesis is concerned with :

Understanding the User-IT Professional relationship
by exploring the
values, beliefs and perceptions which both parties bring to this process of interaction.

As outlined in section 1.4, the User-IT professional relationship is very infrequently addressed and would appear to have been overlooked as a fundamental part of the innovation process. Consequently, this thesis aims to develop an understanding of the *process* of IT innovation in which IT contributes to business performance.

For further clarification, this relationship is to be studied within organisational settings. Whilst outside elements, such as the computing industry at large or government legislation, may effect the internal technological arrangements of an organisation, they are considered beyond the scope of this study. With this in mind, a further boundary may be established, namely that this thesis addresses:

The Process of IT adoption and assimilation within organisations.

The use of the terms adoption and assimilation as conceptual devices, is explained in Section 1.3, above. Also, the important distinctions between the two concepts is outlined. Furthermore, it is suggested that successful assimilation will result in enhanced business performance and/or competitive advantage.

IT professionals are defined as the technology professionals and staff who share responsibility for some element of the design, implementation and/or support of the IT infrastructure within a company. Users incorporate the range of organisational members who are required to utilise and absorb IT into their work activities, but who are not part of the IT function. The use of the phrase 'IT infrastructure' begs further clarification. This may be seen as the range of computing hardware, software and information systems generally found in an office environment. However, it is important to note that the technology is not the focal point of this thesis, rather it addresses the interaction between the various parties involved in adopting and assimilating the technology. As such, this thesis emphasises the *service delivery* component of the IT innovation process, central to the user-IT professional relationship.

1.6 Overview of the Thesis.

This chapter has looked at the relevance of current thinking on the innovation process to the management of technology, in particular information technology. Furthermore, it has outlined the differences between variance and process approaches and their relative strengths and weaknesses and relevance to this study. Of particular importance is the development of the concepts of adoption and assimilation.

Chapter 2 considers the issues raised by Chapter 1 and formulates a set of research issues and objectives, relative to information technology. These are transposed into propositions which are used to provide a research focus for the conceptual framework. Chapter 3 explains the research design. This operationalises the propositions and outlines the reasoning behind the design of each research activity.

Chapters 4, 5 and 6 explore separate aspects of the delivery of IT services. This ranges from the selection requirements of IT professionals, IT professionals' values and perceptions, and understanding of the literature output of the IT profession.

Chapters 7 and 8 explore the receipt of IT services. Chapter 7 examines the service delivery perceptions of users by applying elements of a service delivery model. Chapter 8 encompasses a set of in-depth interviews to understand how a range of users perceive the IT adoption and assimilation process. Chapters 7 and 8 are complementary.

Chapter 9 provides a collation of the overall findings from the research activities and then explores the findings with respect to the original conceptual framework and develops a model of the process of IT adoption and assimilation.

CHAPTER TWO

Conceptual Framework and Research Propositions.

2.1 From Chapter 1 to the Propositions.

The first chapter discusses some of the weaknesses of linear models and their continuing impression on the innovation process debate. In addition, where such weaknesses have been realised by academics and practitioners the solutions recommended would still appear to be the product of a technical perspective. Of particular interest is the current management of information technology (IT) within organisations, where the author highlights the dominance of the linear approach and technical perspective. This can be seen in the notion of adoption and assimilation, as discussed in Chapter 1. Some of the weaknesses of the contemporary debate are thoroughly explored by Seaton and Cordey-Hayes (1993). Three key issues concerning technological innovation arise from their discussion. These are:

1. The inability to address issues of a social, organisational, or user nature,
2. The failure to recognise the importance of the process of interaction between various parties to technology assimilation,
3. The incongruence between (articulated) business needs and the technology solution.

Using these ideas, and the criticism of existing research approaches in the IT field (Markus & Robey, 1988; Newman & Robey, 1992), it is now possible to identify three main issues which lie at the centre of this research, where IT innovation is considered from a process perspective and where the distinction between adoption (which is the way in which much existing work in IT can be seen) and assimilation is made. These issues are:

1: **A lack of IT and business integration**, which is manifest in the "failure" of IT to satisfy business need and the general decline in management's ability to oversee the operations of its technical units;

2: The dominance of a **technical and economic perspective** in technology management, with little or no consideration of other influences;

3: **The 'culture clash' of IT professionals with their organisational management**, due to fundamental differences in outlook and objectives.

A number of points were raised in section 1.5, concerning the perspective and bounding of the research. This highlighted the intention to focus on the user - IT professional relationship *within* the organisational context. Chapter 1 explores the significance of this relationship to the process of IT innovation, in particular the adoption and assimilation of IT by users. Further attention is drawn to a service delivery, rather than technology orientated focus. When due consideration is given to these points, it is possible to define a precise research objective:

To Construct and develop a conceptual process model of IT innovation:
which distinguishes adoption from assimilation,
in which IT contributes to business performance and
which focuses on the IT professional/user and user/organisation interactions in the context of service delivery.

These issues, and the research objective, can be transposed into propositional statements as a way of enabling the research design to focus. The propositions are used as a conceptual framework for guiding the research design (see Chapter 3) and activities (Chapters 4 to 8).

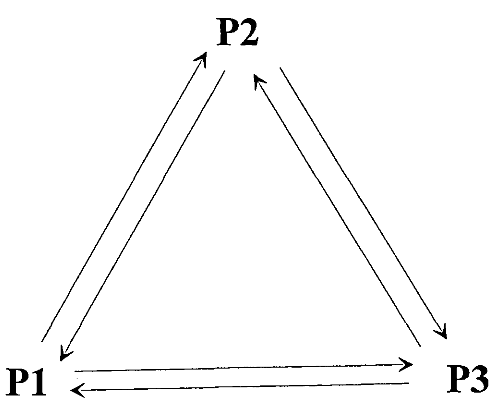
1: **The lack of IT and business integration**

As the stimulus for IT and business integration increases, the greater is the demand for senior management to take responsibility for managing their technical functions. By the same token, the demand for integration is hindered by greater technological uncertainty and problems of technology management, as well as unforeseen political ramifications. See section 2.2.

2: **The dominance of a technical and economic perspective**
The greater the technical orientation of IT professionals, the less likely it is that either organisational or individual influences are to be considered. In addition, the approach to technology adoption is more likely to follow a technologically deterministic and linear development path. Associated with this is a short-termist economic outlook which, where more prevalent, will make technology innovation more difficult to justify.

3: **The 'culture clash' of IT professionals and organisational management**
Fundamental differences in outlook and objectives exist between IT professionals and their organisational management. The greater the degree of incongruence, the more likely there is to be organisational conflict and an adverse use of power, with respect to the organisation as a whole.

Before using these propositions in the research design it is important to examine them in greater detail and discuss the literature that supports them. Sections 2.2, 2.3 and 2.4 discuss propositions one to three, respectively. Section 2.5 endeavours to link the propositions by means of a skeletal framework. This framework begins to explore the interconnected nature of the three propositions through the following form:



Finally, section 2.6 presents the service delivery related literature which provides explicit justification for the service delivery questionnaire conducted in Chapter 7. The relevance of this literature to the management of information technology is also discussed.

2.2 Proposition 1: Lack of IT and Business Integration.

This proposition details the shift towards the strategic use of IT in recent times. Furthermore, it recognises how the introduction of such technology can fundamentally influence an organisation, placing a far greater onus on senior management to take responsibility for managing technical functions, if the strategic benefits are to be realised. Finally, the main obstacles to business and IT integration are explored to illustrate what has fuelled the general decline in management's ability to oversee the operations of its technical functions.

2.2.1 The Drive for Greater Integration

In the past the lack of IT and business integration has not seemed so important or necessary. The issue has not been of overwhelming concern to either senior management or IT professionals. However, throughout the 1980's this issue has grown in stature for two central reasons; changes in the application of information technology and changes in the competitive environment in which organisations are expected to operate.

Since the real growth in computing during the 1960's the application of IT has changed substantially to satisfy the changing nature of the envisaged benefits. The main generic benefits of IT, each corresponding to a so-called era of IT usage (see figure 2.1), are defined by Silk (1990) and Bytheway and Dyer (1991) as:

a) *Efficiency*: a shortening of the time needed to complete a work task, i.e. doing the same job better and thus saving other resources.

b) *Effectiveness*: the ability to restructure work to allow employees to utilise their time more constructively resulting in quality, excellence and image improvements.

c) *Strategic Advantage*: improving the business by exploiting the ways in which IT can support or drive strategic business change. Bytheway and Dyer describe this phase as *Evolution* because the application of IT in this arena may frequently cause a restructuring or redefinition of the business, even leading an organisation into new business opportunities.

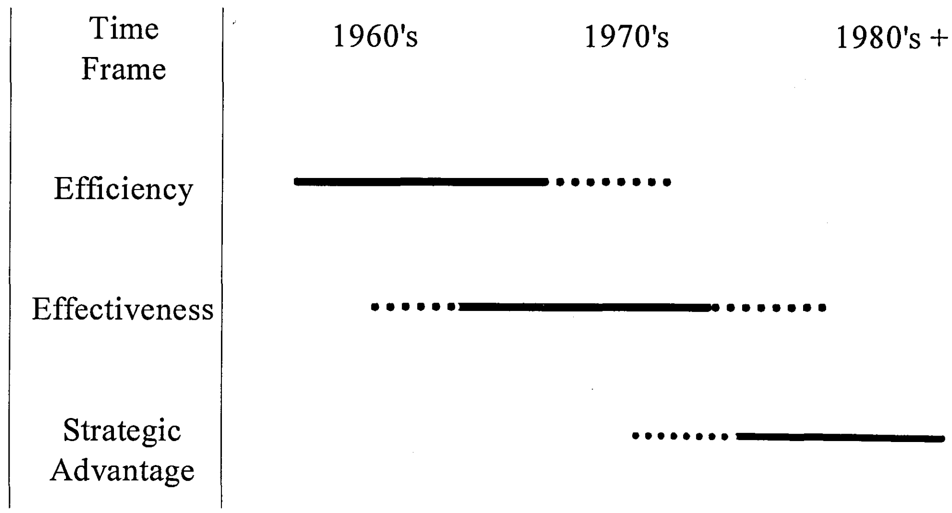


Figure 2.1 - Era of IT Usage

Silk (1990) makes the important point that these benefits depend on the management context in which the technology is designed to operate. In a similar vain, Coombs discusses how the application of IT has moved from *automating* business to *transforming* it. Consequently, this has resulted in an increased need to 'treat IT as a major feature of the genuinely strategic discussions which take place' (Coombs, 1992).

For the majority of organisations the competitive environment has become more 'hostile'. Operations have taken on a global component as companies are required to trade in an ever-increasing international arena. In addition, increased product quality and a decreased time for getting products to market have meant that organisations must satisfy new competitive requirements. In recent years recessional pressures have demanded that organisations improve productivity and rationalise their business processes in the face of retracting markets and increased competition. Consequently, there is a greater pressure for the control of IT to be with the people directly involved with the core business processes. As Boynton, Zmud and Jacobs (1992) stress:

> *"Although IT managers possess the technical know how, IT applications are best led by line managers*[1] *who thoroughly understand the business"* (Boynton et al., 1992)

[1] where 'line managers' refers to general managers who report to functional areas other than information systems departments.

The move from efficiency and effectiveness applications to strategic applications magnifies the need for integration between the business and technical functions. Added to this, the modern business environment demands that the organisation is able to provide a co-ordinated (and successful) response within ever-decreasing time scales. The following sections outline some of the obstacles and tensions generated by this situation.

2.2.2 Technological Uncertainty

Moriarty & Kosnik (1989) highlight the uncertainty concerned with the initial phases of any new technology:

> *"Confronted with a radically new technology customers may not understand what needs the technology could satisfy."*

Furthermore, there is uncertainty as to whether the technology can meet user needs. Because of such uncertainties the appraisal of needs is made more complex. Further uncertainty surrounds the rate of technological substitution taking place within the computer industry. This refers to the rate at which one form of innovation, whether hardware or software, is superseded by another. Modis (1993) has studied the rate of technological substitution in the computer industry and concludes that as software becomes more compatible the rate of substitution will reach 80% in less than one year, representing an extremely rapid process of development. This means that within such a climate of change it is increasingly difficult for managers to select technologies to satisfy business needs.

As a consequence of the rate of change and the lack of understanding of IT, the degree to which an organisation can plan for IT is severely diminished. This is compounded by the IT function's apparent lack of understanding of business needs (see section 2.3). This only serves to undermine a 'needs oriented pull' and reinforce the technology driven approach explored in chapter one.

2.2.3 Problems Associated with the Management of the Technical Function

Lack of a Conceptual Framework

Increasingly, IT seems to work in an autonomous manner, poorly integrated with business strategy. The need for more effective management of technical functions & resources has been highlighted by Adler et al. (1992) who state that effective overall business strategy must be 'buttressed by explicit & complementary strategies in each of the business's functions'. Although the original focus of this work was research and development (R&D) it has direct relevance to IT. This identifies the lack of a conceptual framework for IT and, in a similar way to R&D, there has been a piecemeal approach to assessing the IT units' overall functional strategies. Current approaches to integration have a tendency to draw extensively from fashionable management techniques, the most popular of these being Porter's value chain & framework for competitive advantage (Porter, 1985; Porter & Millar, 1985; Venkatraman et al., 1993; Harvey et al., 1993) the value chain at national level (Thow-Yick, 1993), Rockart's critical success factors (Byers & Blume, 1994; Pollalis & Frieze, 1993; Hochstrasser, 1993), and McFarlan's portfolio analysis (Ward, 1988, 1992; Gupta, 1989).

Whilst injecting a business perspective into the management of the IT function, these techniques tend to focus on high level business concerns without exploring how organisations should structure and manage their IT resources. As a rule, the process of using such techniques is the preserve of senior management. Consequently, it excludes any technical representation, to counter balance some of the technological uncertainty, or general managers, who will carry the burden of following the new strategy in the firm's operational activities. Furthermore, the purpose of these techniques is to provide a framework for *finding* business applications and, as such, fail to specify any practical steps for implementing a new strategy.

Issues of Structure and Responsibility

During the 1960's and early 1970's organisational computing was a largely centralised activity. This was due to economic, technical and operational limitations (Lee, 1988). Technical developments have lead to physically smaller and more powerful computer hardware, whilst improvements in software have made computers easier to use; both easier to operate and easier to apply to business problems. Accordingly, the financial costs associated with acquiring computing technology have fallen substantially. IT training and education, coupled with a growing familiarity with IT means that most organisations now have a workforce who have the knowledge and skills to create and use information technology. Running parallel to the technological developments, there have been substantial changes in the role played by IT in business. Increasingly, information is recognised as a crucial resource, even critical to organisational success, and the systems and technologies used to manipulate it are viewed in a more serious light. As previously described, IT is seen as a strategic resource due to the organisational changes it can stimulate. Such technical and business changes have created two new questions for the senior management agenda:

a) What structural arrangements should be established for managing IT, and
b) where should the responsibility for IT activities lie?

Several authors have explored the nature of the structural arrangements made for managing IT, most notably:

> Bloomfield & Coombs (1992), Payne et al (1992), Lohrasbi (1991), Winfield (1991), Feeny et al. (1989a), Earl (1989), Christy & White (1987), Bjørn-Andersen et al. (1986).

However, as Hodgkinson (1992, 1990) states, by far the bulk of this literature is focused on hardware and technical issues, with little or no consideration of management issues. This suggests that decisions on the management and control of IT resources and systems development issues are determined from a technical perspective. To rectify this Synott & Gruber (1981) and Tavakolian (1989) recognise the need to manage the information resources of a firm to achieve business, rather than IT objectives.

Much of the discussion on the organisational structures best suited to managing the IT function concentrate on a 'centralisation versus decentralisation' debate. This is important because it raises the question of how best to manage IT for business ends; whether control of resources and expertise should be held centrally or distributed out to individual business units. A centralised structure is of concern to many managers because it places control of computing in the hands of the technical experts who often have different motivations to their line management colleagues. In addition, the process of centralisation has traditionally created a pseudo-bureaucratic 'empire' unable to respond to the demand for systems development from the organisation as a whole. Throughout the 1980's this 'failure' of many centralised IT authorities to keep up with system development stimulated the acquisition of desktop personal computers (PCs). Furthermore, to the end-users centralised structures have appeared remote and less responsive to their needs. Under such a framework of authority IT services are perceived as limiting user input with no local accountability for the quality and nature of services provided.

By contrast, senior management must face a number of decentralisation related issues. In simple technical terms it is appealing (issues of cost left aside for the moment) to see the growth of computing capability amongst an organisation's employees. The dissemination of the technology means that control is with the user and hence it is more likely to be responsive to local needs and business focused. However, following such a path carries with it a series of management issues. Uncontrolled and unregulated technological growth requires careful management to ensure that adequate controls and standards over corporate data are maintained. Also local control frequently lacks technical expertise (Synott & Gruber, 1981). Senior managers must reconcile themselves to passing a substantial degree of decision making responsibility down to lower level executives.

Much of the literature concerning issues of centralisation and decentralisation is very polarised, alternating between the two extremes. What is at the heart of this dilemma is how best should IT resources be managed. Senior managers have to find a balance between empowering users to apply systems to business ends and ensuring a sufficient level of technical expertise is provided by IT professionals so that the organisation as a whole is not compromised. A survey conducted by Feeny, Earl and Edwards (1989a), investigated how a sample of complex organisations structured their IT services, and concluded that most companies arrive at some mix of centralised and decentralised structure across the whole organisation:

> *"Such a federal structure seems to be emerging as the preferred solution in most organisations. It comprises a central unit for formulation and monitoring of IS* [information systems] *policies. This is complemented by some devolution of IS resources to business units" .. "accompanied by a number of management processes for integrating IS with the business"* (Feeny et al., 1989a).

However, it is important to note that Feeny et al. identify the characteristics of the host organisation as the primary variable in determining the suitable make-up of the

IT structure. IT structure should be seen to complement the overall organisation structure if it is to integrate and serve business needs. Further, it is suggested that the degree of integration desired by an organisation should be matched by the structure of the IT function.

So far this discussion has focused on the structural problems associated with the management of the IT function. A subsequent problem, demanding increasing attention, concerns the question of who is best suited to take responsibility for IT activities, if IT is to be consistently linked with an organisation's day to day, core business processes.

The growing awareness amongst general managers of the potential of IT in business is much documented. However, it is left to the Chief Information officer (where one exists) or IS manager to sort out. As Vitale et al. state:

> *"IS managers frequently find themselves charged with responsibility for identifying and implementing strategic applications"* (Vitale, Ives & Beath, 1986)

A range of formal approaches are frequently suggested to foster collaboration between users and IT professionals. Commonly, they are designed to 'share' responsibility between the IT function and the other business functions and include IT steering committees and cross-functional teams (Feeny et al, 1989b; Cache et al, 1988; Kerr, 1989; also see section 4.4.4), IS charge-out procedures as a formal protocol (Allen, 1987), and participative IS development methodologies (Gronlund & Guohua, 1993). A further recommendation concerns the appointment of 'Account Managers' within the IT function to be responsible for particular user communities.

Whilst formal approaches are popular with many companies, a report carried out by Ernst & Young suggested that such approaches appear to fail in combining IT and business strategies (Ernst & Young, 1990). This is probably accounted for by a number of reasons. Chiefly, it is often stated that for IT to complement business aims it must have the support of senior management. The lack of such support can lead to a strategic misalignment (Ewusi-Mensah & Przasnyski, 1991). Furthermore, IT professionals and business managers have different motivations and perspectives (discussed in section 2.4) which may mean that neither accurately understands the other. Indeed, Vitale et al. (1986) argue that such approaches are flawed because they rely on a top-down approach to interconnecting strategies which assumes that "managers are well informed about the organisation's resources, in particular, the organisation's distinctive competencies".

By contrast, several authors suggest alternative approaches. Recent literature has advocated the notion of the 'hybrid manager' to act as a go-between or co-ordinator between users and specialists (Skyrme, 1992; Earl and Skyrme, 1990; Palmer, 1990). Responsibility is embodied in a key individual who understands both the technical issues and business needs and who is respected enough to bridge the gap between the general and IT functions[2].

The work of Earl and Skyrme suggests that where specific examples of "hybridisation" have been reported, significant improvements in the development and quality of IT innovations have been claimed. However, they sound a note of caution by concluding that :

> *"Hybrid managers alone are unlikely to be enough. The organisation needs to create the right climate and use whatever other bridging mechanisms are appropriate in combination"* (Earl and Skyrme, 1990).

The success and relative merits of the hybrid approach are hard to calculate and, to date, there is little recorded evidence relating organisations' practical experiences.

Following a similar line of thinking, Vitale et al. (1986) take this a stage further by developing an adaptive model. According to current strategic management thinking (Quinn, 1980, 1989; Johnson, 1988) this adaptive model, unlike the top-down models embodied in formal approaches, seems closer to the way most companies actually produce and implement strategy. Strategy is seen to deal less with predetermined goals and more with evolution and incremental change. If business and IT are to be combined to a greater extent then Vitale et al. imply that approaches to integration should complement the way it is believed that organisations genuinely develop strategy. The adaptive model comprises of five roles. These include technical experts, familiar with how the technology operates, what its costs and capabilities are and, more importantly, what the organisation's own strengths and weaknesses are with regard to the technology. In addition, a co-ordination role is described whereby one or more relatively senior IT executives act as intermediaries between users and line managers and the technical experts. What is evident from the definition is that this role is not expected to have any knowledge or understanding of business needs and as

[2] a more detailed discussion of 'hybrids' is to be found in section 6.4.2 of chapter six.

such it is hard to see how this will benefit user groups. Two further roles encompass responsibility for making financial resources available and deciding when to abandon certain user projects. The final role is the one of 'teacher'. This person is responsible for the diffusion and assimilation of IT knowledge amongst users and business understanding amongst the technologists. It is this role which appears best suited to fostering an understanding of the potential for business and IT integration amongst all staff.

One notable problem with both the adaptive model and hybrid managers is that the responsibility for IT and business integration rests in the hands of a few key individuals and, accordingly, responsibility is not encouraged to filter down through the rest of the business. Taking this into account, an alternative 'solution' has been suggested which involves the re-alignment of IT management decision-making strategies with the general business strategies (Boynton et al., 1992). This is achieved by a redistribution of responsibility for IT management and resources. Responsibility is shifted away from its traditional home amongst IT professionals and dispersed amongst the line managers who utilise the technology in the day by day running of the organisation. The proposed benefit is that it links technical know-how with a general management perspective (Henderson & Sifonis, 1988). The rationale behind re-alignment is that in firms where the IS function dominates IT management, line managers (and the users in their departments) have to place the fate of their operations in the hands of the technical experts. Consequently, they resist relying on IT resources which they neither control, nor fully understand. With the increasing emphasis on IT, it is believed that line managers will be opposed to dependence on a central IT function, even if its IT staff have been responsive to their needs in the past. Boynton et al. conclude that:

> *"With dispersed responsibility, line managers will use IT resources more effectively, learning to apply IT to business tasks just as they apply human, financial, and other key resources to business opportunities, problems and threats"*

and reflecting on the notion of hybridisation, they maintain that:

> *"No techniques aimed at bridging the knowledge gap between IS specialists and line managers can substitute for synergistically uniting IT knowledge with business knowledge within one person - the line manager"* (Boynton et al., 1992).

2.2.4 Justifications for IT

Both IT professionals and line managers are increasingly being called upon to justify their investment in computing technologies and to explain how computer systems benefit the overall business (Van Kirk, 1993; Mirani & Lederer, 1993). The appraisal of costs and benefits becomes more necessary if value for money is to be obtained from existing systems. The increasingly competitive business environment (described previously) and scale of IT expenditure means that managers, throughout organisations, are ever watchful of the opportunity cost. They are responsible for committing huge organisational resources in terms of money, time and personnel and naturally want to understand and appreciate the risks they are being expected to take.

In the past systems have generated efficiency related benefits (see figure 2.1). This is appraised using well established techniques and principles, e.g., cost benefit analysis, return on investment. With the move towards strategic applications, and to a lesser extent effectiveness applications, these techniques no longer apply.

> *"The general problem is that investment appraisal rules (or the accountants who administer them) focus too narrowly on those savings which can be quantified easily, but refuse to acknowledge important benefits because they cannot easily be expressed in precise money terms"* (Gunton, 1988).

Furthermore, traditional methods have at their centre a technical and economic perspective (detailed in section 2.3). In accounting circles the dominant paradigm is that IT is 'just another capital expenditure' (Sassone & Schwartz, 1986). This is evident in what Symonds (1990) describes as a 'quasi-scientific formal-rationalism, oriented chiefly towards technical aspects' and ignoring the social complexities of the organisation. Coombs (1992) suggests that mistrust of IT means that senior and line managers want it justified in this manner. Also, past overspends and recent large scale 'failures', such as the London Ambulance Service, the Stock Exchange Taurus system and Wessex Health Authority, not to mention a myriad of small scale cases, have created a climate of suspicion amongst senior management (Money Programme, 1994). As previously stated, managers want, or feel obliged to provide, hard facts and figures. The work of Farbey et al. (1993) emphasises that many organisations do not evaluate their IT investments at all, and that where evaluation is conducted it concentrates on the conventional accounting techniques, mentioned previously. The negative aspects of this approach are that it limits vision and locks management into systems which provide short-term payback. However, for information systems evaluation to be meaningful, both non-technical (i.e. social) and technical criteria need to be included. The former are subjective in nature and therefore attempts to quantify them so that 'scientific' analysis can be applied, prove methodologically problematic (Hirschheim & Smithson, 1987). Accordingly, current evaluation approaches neglect the social aspects in favour of technical criteria. Therefore, there is a need for a more comprehensive approach. However, it is argued that:

> *"For such an approach to become accepted, something of a paradigm shift is likely to be required; from an 'objectivist' conception of inquiry to a 'subjectivist' one. Unfortunately, as paradigm shifts are not easily brought about, evaluation approaches seem destined to remain limited in nature"* (Hirschheim & Smithson, 1987).

Accordingly, systems which are strategic in nature create a problem as benefits are qualitative and intangible, for example, gains in customer service, improved management communication and decision making or an enhanced corporate image (Schumann, 1989; Mirani & Lederer, 1993). Justification adopts a 'soft' form, based on qualities such as the intuition or 'gut-feel' of certain staff (Symonds, 1990) or similarly as an act of faith based on the judgement or vision of senior management, where the business is believed to benefit from a change in direction (Silk, 1990; Alavi, Nelson & Weiss, 1988). As Symonds states:

> *"It seems to be the case that the greater the expense and strategic importance of an information system, the less likely it is to be evaluated using a formal methodology"* (Symonds, 1990)

Strategic applications are increasingly enmeshed with other business operations. Costs may be spread throughout an organisation and over a long time scale. Equally, the benefits which accrue will, in all likelihood, be seen in other areas of the business and over a long time horizon. Symonds points out that complex systems require more complex support and training and that it is not clear how such ongoing expenses should be allocated. Furthermore, insidious effects may be associated with a system, for example, a decline in employee motivation. Symonds concludes that:

> *"Quantification of benefits is thus uncertain and subjective and quantification of costs subject to the detail of accounting procedure"* (Symonds, 1990)

As the result of these problems with assessing the intangible costs and benefits a number of alternative approaches have been sought and utilised within the organisational context. These include:

- *Strategic modelling approaches*. Taken from strategic management practice, these provide a way of addressing the business angle in a strategic, more long term approach. Justification rests with the ability of a particular information system to complement an existing portfolio of systems (Ward, 1988, 1992; Gupta, 1989). A system is either accepted or rejected on these terms without making any substantial assessment of financial costs and benefits.

- *Information economics* applies a decision framework that separates the business justification for information technology from the technology viability for a proposed application. The focus is shifted away from technology and towards the key organisational resource - information. By employing this approach information systems are assessed, not in terms of short-term benefits, but on the *value* of the information to the organisation. This means that information value can be assessed in terms of competitive advantage given or potential to enhance management decision making . This has the added advantage of being organisation specific (Parker & Benson, 1988; *cf.*, Strassmann, 1986).

A further concern for management is the comparison of alternative systems. Traditional accounting techniques rely on some common currency, usually financial in nature, in order to compare like with like. Again, the push towards the strategic application of information technology frequently creates qualitative elements which disable simple comparison. Occasionally, alternatives may be compared using some aspect of business, say market share gained or new customers generated, but this may only be done accurately with hindsight.

To conclude, justification is a hurdle to business and IT integration for management to negotiate. The current environment[3] requires a quantification of costs and benefits and

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[3] comprising the perceptions of management and accountants, organisational competitiveness and industry structure, in particular the recession

demands that benefits arise in the short term. This can only stifle the strategic use of IT.

2.2.5 Organisational Politics

In planning for and applying IT the manager has to balance the influence and effects of the technological change on the different members of the organisation.

Coombs (1992) refers to IT's changing impact on the organisation and mentions the need for strategy integration but suggests that the strategic direction of IT becomes an 'organisational battleground' due to political issues invoked by the technology. Furthermore, Beirne and Ramsay (1992) state that the influence of IT is often analysed in a fashion which depoliticises the real processes involved. What appears as an opportunity in one part of the organisation may be seen in an entirely different light by another (Symonds, 1990).

A further angle on this issue is provided by Gupta (1989) who points out that:

> *"People in organisations usually behave rationally and logically, given their own needs and interests, but individual rationality is no guarantee of organisational rationality."..."* [Therefore] *to implement strategy successfully, short-term planning activities must focus on the translation of long-term needs to short-term performance measures and congruence between individual and organisational goals"* (Gupta, 1989).

Bloomfield and Coombs (1992) stress the role that IT can play as a tool to centralise managerial control over a workforce. Managers should be aware of the potential for change in working practices. Conflict may arise when those affected by the introduction of a new technology are subjected to a deskilling (or reskilling) of their work (Clark et al, 1988; McLoughlin et al. 1985). In addition, the organisational power associated with and derived from information itself must be born in mind. Information systems have the capacity to encapsulate a body of information within a technological framework, so determining the content of such a system is frequently contentious. Indeed, it is suggested by some researchers that 'information systems tend to reinforce the power of already potent players' (Bloomfield & Coombs, 1992; *cf.* Kling, 1991).

So, attempts to marry business and IT strategy must take into account that introducing any technology, let alone one as potent as IT, can create severe political change. Distortions to the organisational balance of power must be considered, without allowing the goals of sub-units to override the long-term aims of the organisation as a whole.

2.3 Proposition 2: Technical & Economic Perspective

There is considerable evidence that there is a tendency, for a variety of reasons, for IT professionals to view their roles in purely technical and economic ways. This influences the way in which they define, perceive and discharge their duties. This proposition discusses some of the reasons why this situation exists and explores the problems associated with this perspective. In addition, alternative approaches are suggested.

2.3.1 Technical Orientation: Sources, Approaches and Implications

Historically, the growth in the use of information technology has depended on people with a high degree of technical computing skills. Without the necessary technical skills it has proved virtually impossible for an organisation to develop and support its own IT capability. As a consequence, IT staff have understandably been drawn from a programming background which predisposes them to following a particular philosophy of system design, implementation and support.

The technical orientation of IT professionals has been highlighted in a number of studies (Noble & Newman, 1993; Symonds, 1990; Kumar & Bjorn-Andersen, 1990; Newman & Rosenberg, 1985; Markus, 1984). This is frequently seen as part of a wider scientific, rational perspective which places emphasis on logical and causal explanations of events so as to produce standardised rules and principles by which to guide actions. With respect to IT, this is embodied in the belief that technology is responsible for change and technology is the cure to most organisational ills. Organisational structure and user involvement are, at best, seen as passive elements, and at worst non-entities. The background and training of IT professionals, and the traditionally narrow definition of their role in information system development, often leave them unaware of the organisational issues which affect their work (Kumar & Bjorn-Andersen, 1990). The ways and means by which IT professionals are educated places little emphasis on organisational sensitivity. The over-emphasis on the technology during training promotes a deterministic view of technology within organisations, and a belief that all problems can be solved by means of some 'technical fix'. This follows the technology push argument discussed in chapter one. The technical perspective which dominates the education of IT personnel is strongly reinforced in much of the literature concerned with the theoretical and practical application of IT within organisations (see chapter 5; Mumford, 1972). This is critical because this literature represents much of the current practice and informs future approaches to IT management.

The technical rationale permeates all aspects of systems development and systems assessment. Traditional systems analysis and design methodologies (SSADM, SADT, Yourdan etc.) largely follow the principles of scientific management - functional analysis, hierarchical decomposition, task fractionalisation, and division of labour - and consequently tend to produce highly structured jobs and organisational procedures (Markus & Bjørn-Andersen, 1987). These approaches emphasise the rational process of technical design, whilst any social processes are not included in any analysis and are not seen as part of the analyst's function (Eason, 1992). In addition, Eason maintains that the technically-centred design process is also unlikely to allow user stakeholders to see that their interests have been fully considered during design. Similarly, Markus (1984) stresses that traditional methods of system analysis and design intend only to address technical system features. Furthermore,

> *"They ask no questions about organisational features and offer no suggestions for incorporating these in system design. They provide no guidelines for soliciting or including the input of specialists in methods of human relations"* (Markus, 1984)

Overall responsibility for projects often rests with an IT specialist or analyst. Holden (1991) argues that this confuses the technical skills required to develop a system with the management and organisational skills necessary to make the system work in the company. Indeed, information systems are often only seen as completed when they are <u>technically</u> completed (Bjorn-Andersen & Hedberg, 1985).

Traditional approaches give the impression of 'objectivity' i.e. that it is possible for an observer to stand back from a situation and give an objective, unbiased and impersonal description. Linstone (1984) rejects the assumption of objectivity on the part of the scientist or technologist as a myth, and explains further that:

> *"The claim that the properties of an observer must not enter into the description of his observation is nonsense, because without the observer there are no descriptions; the observer's faculty of describing enters, by necessity, into his descriptions"* (Linstone, 1984)

Likewise, Winfield states that:

> *"Observation, the very cornerstone of empiricism, is never in itself totally value-free, particularly where the observation of human behaviour is concerned"* (Winfield, 1991)

The predominance of the technical perspective in the management of IT fails to recognise that a good deal of subjectivity is involved, resulting from the concerns of different organisational actors. Winfield (1991) stresses that organisations are essentially peopled by human beings, despite any mechanistic or biological analogy, and that people hold a variety of values. Accordingly, subjective qualities should be expected to enter into any technical assessment process which demands such a high level of interpersonal interaction and communication. This subjective situation exists within any user-IT professional relationship regardless of whether the relationship is based on systems development or support activities. However, by adhering to the technical perspective alone the IT professional may overlook any subjective appraisal. Effectively, this reinforces the notion that there is no need to consult users at any stage of the development process, and user attributes rank well below other priorities in implementation and system design. Accordingly, system success is measured in technical terms, using techniques and procedures which the IT professional can relate to and that frequently provide some quantifiable measure of 'success'. This has a tendency to play down the supporting role of the IT function. User participation and training are not viewed as crucial to system success and are often not included in the IT professional's remit.

The dominance of a technical perspective may also be seen in the IT function's deterministic approach to understanding IT adoption and application. The widely held belief that IT may be understood by means of a linear (technology push) model leads the IT professional to see his/her role in an over-simplistic way. The perceived role of analysis is to reduce an IT development problem down to a series of logical, even causal, stages. However, organisational realities frequently generate complex problems which embody a good deal of non-linear human interaction and, therefore, cannot be broken down into sub-systems or component parts.

IT professionals often attribute systems failures to user resistance (Markus, 1984 *cf.* Sauer, 1993), which suggests that they see people as the problem hampering a successful technical solution. It has been observed that managers who object to a system are seen, by IT personnel, as blocking progress (Stevens, 1993; Newman & Rosenberg, 1985) whilst user participation is often manipulated to satisfy the perspective of the system designer (Newman & Noble, 1990; *cf.* Fincham, 1994). However, it has long been maintained that involving users is more likely to ensure favourable IT adoption and assimilation than an emphasis on the quality of the technical performance (Leonard-Barton & Sinha, 1993). Indeed, user perceptions of the levels of involvement has been shown to have a direct, positive and significant impact on user satisfaction (Amoako-Gyampah & White, 1993). Despite this, systems failures still occur as the result of a lack of appropriate communication and the absence of a common language between system developers and users (Janson et al., 1993). Equally, the difficulty in getting users up the IT learning curve reflects the fact that computer systems and IT environments are still primarily designed for use within a skilled occupational community (Fincham, 1994).

The Motivational Characteristics of IT Professionals

A number of studies have addressed the personality characteristics of IT professionals. These studies have explored the differences in general outlook, temperament and work motivation between IT personnel and other organisational groupings.

The results of a Job Diagnostic Survey, undertaken by Cougar et al., concluded that a substantial majority of IT professionals have a low need for social interaction. This may have important consequences for effective communication between IT staff and users (Cougar & Zawacki, 1980). Ferratt and Short (1986) have contested the motivational differences found in previous studies. However, the focus of their work was on the motivational determinants of productive work behaviour rather than measuring social needs. This suggests that IT personnel are as motivated as other employees, however their study doesn't investigate the motivation to social interaction, explored by Cougar and Zawacki. In reviewing a number of studies and observations on IT professional characteristics, Markus (1984) concluded that:

> *"Many of those whose role it is to work with clients* [users] *to determine needs and objectives for systems find more satisfaction in the technical aspects of their profession than in the social process by which specifications are determined".*

This is supported by Newman and Rosenberg (1985) who state that IT professionals have a fascination for technology and problem solving. Accordingly, people who are fascinated with technology choose positions where technological emphasis is required and rewarded and that this can become endemic. Winfield (1991) concurs with this by stating that 'this damaging legacy lives on today'. Kumar and Bjorn-Andersen (1990) highlight the techno-economic value orientation of system designers and demonstrate how personal values may influence system effectiveness in organisations. Guimaraes and Igbaria (1992) compared two types of IT staff - a traditional information systems (IS) role and an information centre (user liaison and support) role. They found that support role staff were very likely to be employed for their interpersonal and communication skills. Consequently, they were psychologically better prepared to handle interaction with users than IS role staff. By contrast, IS employees had a more technical background with less emphasis on people skills.

The cognitive style of IT professionals has also been called into question. Keen and Bronsema (1981) maintain that IT professionals show systematic differences in cognitive style to the majority of users, and that this helps explain system implementation difficulties. Lyons (1985) surveyed over a thousand IT personnel with the aim of understanding their personality preferences and psychological types. 70% of the survey participants were found to be introverts. This is the inverse of the general population where 70% are extroverts. IT personnel were also found to be predominantly "thinkers" rather than "feelers", with 80% demonstrating the logical, impersonal personality type.

Technological Change and the Technical Perspective

The growth of a professional identity, in particular the cosmopolitan characteristics, discussed in section 2.4.3, leads IT personnel to be outward looking. Hence, they look to be informed by their professional groupings and computer industry. Consequently, they feel they must respond to externally generated change (i.e. new technical developments, the latest software versions etc.) which is by and large technically driven (Holden, 1991; Lohrasbi, 1991). Much *hype* surrounds the computing industry and the shortfall between promised capabilities and eventual reality is well documented (Hirschheim & Feeny, 1986; Verrign-Stuart & Hirschheim, 1986; Markus, 1984). In a similar vein, Winfield (1991) deduces that change results from the 'steady flow of products purporting to do things faster and better than ever before' and that this creates a business culture oriented towards finding the quick 'technological fix'. This approach is often categorised as 'technocentrism' and is deeply rooted in IT professional culture (see chapter 4). A technocentric response to computing industry generated change assumes a linear relationship between IT and the end-users and occurs regardless of the suitability of a particular technology to the host organisation. Taking this a stage further, Lohrasbi (1991) argues that, to a certain degree, the rate of technological change effectively imposes the technical perspective on IT professionals.

2.3.2 The Dominant Perspective

Assessment of the worth of IT to most organisations is predominantly achieved using a set of deterministic economic criteria. Discounted cashflow, return on investment and cost benefit analysis are the widely accepted tools for economic analysis. Special emphasis is attached to putting financial value on IT investments, whilst costs and benefits are to be accurately quantified. Senior management demand that precise figures be provided (Cooke & Parrish, 1992). Coombs (1992) suggests that management attitudes are coloured by a mistrust of IT which imposes their economic perspective on the IT function. Accordingly,

> *"CIOs* [chief information officers] *need concrete measures they can use to estimate the value of technology, manage implementations and audit the benefits of delivered systems"* (Kiely, 1992).

Historically, an economic perspective has not hampered the management of IT and is probably best suited to the earlier IT developments which automated business (see figure 2.1). However, these techniques have become widely accepted and are now deeply embedded in IT professional culture. Sassone and Schwartz (1986) suggest that in order to justify the merit of IT, IT professionals have adopted a paradigm which views IT as 'just another capital expenditure'. In addition, Coombs (1992) highlights how IT projects frequently appear to be 'frighteningly expensive and difficult to justify in conventional cost benefit terms'. The relevance here is the emphasis on the use of "conventional" points of reference. The remainder of this section illustrates how the dominant economic perspective does not enable a full understanding of the effect of IT and inhibits the application of IT to potentially profitable areas of business.

There is a tendency using such approaches to measure what can be measured and to disregard what cannot (Linstone et al., 1981). This is often the case with information systems, where the costs (technical hardware and software, programmer salaries etc.) can be quantified, whilst the benefits (increased competitiveness, improved image) cannot. When decision makers find themselves unable to make reasonably accurate estimates of the benefits of a proposed system, then economic analysis dictates that the value of these benefits be made zero (Cooper & Kaplan, 1988; Kaplan, 1986). Clemons points out that such financial techniques frequently use unjustifiably high estimates for the cost of capital as a 'surrogate for dealing with uncertainty'. Furthermore, the development of many IT projects involves long lead times before benefits are felt and is naturally an uncertain process (Clemons, 1993). Consequently, the management of IT is not adequately catered for by a framework of short-term economic analyses.

As was outlined in section 2.2.4, this scenario is all too common the more IT developments move towards providing a competitive or strategic value to an organisation. Benefits are often qualitative and intangible in nature and frequently rely on the judgement, vision and business acumen of a key individual actor (Silk, 1990; Symonds, 1990). In the absence of a formal economic justification the project sponsor (champion) may be expected to shoulder responsibility for the project's success. The dominance of an economic perspective dissuades the development of potentially very rewarding uses of IT because of the focus on short term payback and the inability of economic means of analysis for tolerating the risks attached to project failure.

Attempts to relate financial measures with a set of business criteria have been suggested. These include the *Balanced Scoreboard* method and Curley and Henderson's *Impact Focus Strategy* (both reviewed in Kiely, 1992). However, the motivation behind such methods appears to be to provide a firm measurement and calibration of the course of an IT implementation. In fact, the Balanced Scoreboard method seeks to quantify each criteria so that even customer perspectives have to be quantified in terms of number of defects or time taken to fill an order. All of which, it is argued, can be reduced to a financial measure, usually Return on Investment.

In summary, the dominance of an economic perspective has a deterministic effect on IT management. Current forms of economic analysis place great emphasis on short-term, quantifiable and tangible assets. This tends to predetermine the criteria by which IT is to be managed, regardless of long-term organisational issues and the wider business environment.

2.3.3 Alternative Perspectives for the Management of IT

The dominance of a technical and economic perspective within the management of IT has been outlined above. This section aims to highlight some alternative considerations for successful management. Whilst many of the issues are recognised in the literature (Newman & Robey, 1992; Symonds & Walsham, 1987), in practice they are either overlooked or paid passing lip service (Ewusi-Mensah & Przansnyski, 1991; Ernst & Young, 1991). Much has been written in the past decade about topics such as user involvement, obtaining senior management support or formally building consultation exercises into design methodologies. To a greater or lesser degree these all recognise the need to incorporate other perspectives into IT assessment and management, apart from the single technical perspective.

It is suggested that the notion of multiple perspectives (Linstone, 1984; Linstone et al., 1981; Markus & Robey, 1988) would provide a useful framework for the re-assessment of technology (Seaton & Cordey-Hayes, 1992) by encouraging the consideration of influences beyond a purely technical rationale. The multiple perspectives concept, proposed by Linstone et al. (1981), was developed as a framework for addressing a variety of technology assessment and socio-technical scenarios where, it was believed, that simply addressing technological concerns was not appropriate on its own. As Linstone states,

> *"A process such as a technology assessment must deal not only with the technological aspect but also with social and human facets. The technology is embedded in an environment of human beings - it helps them, hurts them, and changes them. They, in turn, can make decisions to develop, limit, alter, or to stop the technology."*

Figure 2.3 (overleaf) demonstrates how the technical aspects of IT management overlap with organisational and individual perspectives. It also illustrates how a technical perspective alone does not adequately describe the technology adoption and assimilation process. The following notes explain each aspect of the diagram and explore why the same technology can be perceived in different ways by different organisations.

a) Technology - encompasses both hardware and software and represents any number of information systems innovations and a plethora of technical applications. More specifically this may be broken down into its component parts, for example, information storage media, input/output devices, computer networking architectures, and so on.

b) Organisational Actors - This represents a number of possible organisational groupings and may include both vertical (a single department e.g. marketing function, a local company as part of a global enterprise) and horizontal groupings (senior executives, middle managers, clerical staff).

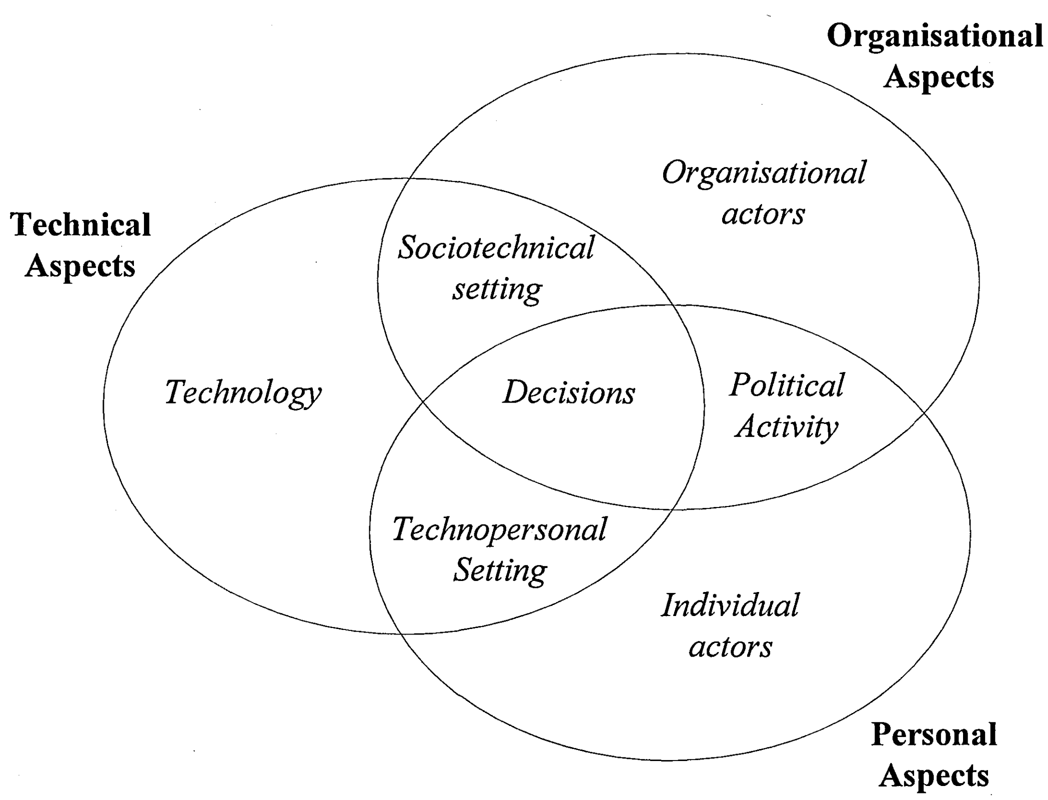

Figure 2.2 - Alternative Perspectives for Technology Management[4]

[4]adapted from Linstone (1984) perspectives of a sociotechnical system.

c) Socio-Technical Setting - This represents the interaction between organisational actors and the technology. This may encompass issues of organisational power, changes to accepted ways of working, changes in autonomy, authority and control. The potential for IT to effect the socio-technical setting is explored in greater depth in proposition three (section 2.4).

d) Individual Actors - here, the focus of analysis is on the individual as separate from any larger group affiliation he/she might have. A person's values and motivations can influence their perception of, and attitude towards change, particularly when that change is stimulated by a potent technology such as IT.

e) Technopersonal Setting - This may represent the influence of a strong or organisationally powerful individual who seeks to manipulate or direct IT management issues as a means of promoting his/her vision for the organisation. With respect to IT the key actors are commonly senior management figures or IT chiefs. In a number of cases such individuals are identified as *IT champions* (Beath, 1992). Equally, the technopersonal setting may represent the interaction between individuals and their particular IT environment. This can have a marked influence on job satisfaction (Kraemer & Danziger, 1990; Clark et al., 1988; Danziger & Kraemer, 1986; Crompton & Reid, 1983). Changes to this environment may create new working procedures which might deskill or alienate the individual or reduce the level of social interaction with fellow workers. By the same token, a change in IT environment might be welcomed as a personal challenge by an individual. In either case it illuminates a number of issues beyond the basic technical considerations.

f) Political Activity - This represents the well recognised interplay between the organisation and the individual. As will be seen in proposition three (section 2.4) the introduction of a new information system or changes to the management of IT services can radically alter the balance between the two.

g) Decisions - This element represents the direct outcome of political activity and, logically, the indirect consequence of all the other aspects (Linstone, 1994). Within an organisation the scope and nature of IT related developments are guided by such decisions. Additionally, the organisational approach to the management of IT is decided, incorporating a formal (and informal) framework controlling the interaction between users and IT professionals. Linstone attaches particular importance to political activity and decisions because it is these two aspects which deal with the process of technology assessment, whilst the previous elements (*a* to *e*) focus on what to analyse.

This proposition has discussed some of the reasons why the management of information technology within organisations appears to be dominated by a technical and economic rationale. It is not suggested that this extreme is the overwhelming condition in all organisations but that a technical perspective is, to a greater or lesser degree, the primary driving force. The degree to which this is the case will vary depending on a plethora of individual qualities and experiences of key organisational actors, and the collective history and situation of the organisation as a whole. With this in mind, the proposition provides a suitable means of enquiry to explore the user-IT professional relationship.

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2.4 Proposition 3: The "Culture Clash" Between IT Professionals and Organisational Management.

A common scenario in many organisations is one of conflict between the IT function and management. It is suggested that IT professionals, as individuals and en masse, adhere to a different set of values and goals to the members of an organisation's management. Further, these goals are not complementary and lead to a divergence of aims which generally do not satisfy business needs.

In order to discuss this proposition it is necessary to consider the nature of a profession (section 2.4.1) and the different types of organisational power which may result in conflict (section 2.4.2).

2.4.1 Definitions of a Professional

Professionals are commonly classified according to two approaches (Raelin, 1992). The *attribute approach* attempts to distinguish professions from non-professional occupations by making reference to a set of attributes which have to be satisfied to a greater or lesser degree. Although there has never been full agreement on a definitive set of attributes the most frequent are :

1. *expertise* - specialised training in a body of abstract knowledge;
2. *autonomy* - the freedom to select problems for consideration and means of solving them;
3. *commitment* - the primary concern is the furtherance or practice of one's chosen discipline;
4. *identification* - the use of formal association structures and/or external referents to identify with fellow professionals;
5. *ethics* - rendering service without concern for oneself or without becoming emotionally involved with the client;
6. *standards* - committing oneself to policing the conduct of fellow professionals (Kerr et al., 1977).

An alternative definition of what constitutes a profession has been proposed, labelled the *power approach*, which attempts to address a more process-oriented perspective[5].

> *"Accordingly, professionals purposely differentiate themselves from other occupations by using political and social influence to advance the status of their occupation. The net effect of a power process would be that the professional group in question would be able to exercise a monopoly over the provision of its expert services while enjoying relative freedom from external intervention"* (Raelin, 1992).

In an earlier study, Raelin (1991) makes the observation that some occupations may attempt to gain professional status, possibly by using the power approach, even though the majority of its members do not fulfil the functional conditions (outlined in the attribute approach). It is suggested that such occupations should be seen as emerging or quasi-professions. It may be that IT professionals should be viewed in this emergent phase.

Similarly, Danziger (1979) refers to a *skill bureaucracy* as a means of identifying elements of a characteristic behaviour evident in professionals. The three distinguishing characteristics of a skill bureaucracy are:

1. it is an *organisational sub-unit* which provides services to particular clients.
2. it has a *relative monopoly* within certain areas of both services provision and technical expertise.
3. its members have an external, *professional reference group*.

These characteristics complement and reinforce a number of the attributes listed above, whilst contributing to an understanding of the potential use of power within the organisation.

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[5]The role of organisational power is discussed in section 2.4.2.

2.4.2 The Use of Power Within Organisations

Numerous authors have discussed the role of different forms of organisational power which are available to any group as methods to reinforce their own professional position (Handy, 1993; Pfeffer, 1992, 1981; Hall, 1987; Newman & Rosenberg, 1985, *and originally* Weber, 1947). A number of different categories of power are directly or indirectly important to the IT function. The most relevant forms of power (to this thesis) are outlined here.

Resource power is to be found where one organisational sub-group is in control of a valued resource which other elements of the organisation want or need. Such resources may be necessary in order for the recipient to fulfil their work role. Consequently, the more a resource is valued, the greater its potential to create a captive 'market' amongst those that need it.

An individual or group may derive power through the recognition of *expertise*. This occurs where someone has acquired significant knowledge or skill in a given area and these attributes are acknowledged and valued by others within the organisation. Expertise power may be the result of formal or informal conditions, for example, through formal qualifications or years of practical experience. Handy states that:

> *"the specialist departments of an organisation, if acknowledged to be expert, will find their instructions readily implemented. Only if their expertise is questioned will they have to fall back on other sources of power" ... "A small differential in expertise can give one person great power over their fellows if that expertise happens to be in great demand."* (Handy, 1993).

Finally, *position power* represents the power or authority attached to a particular organisational role. Whoever occupies a particular position is entitled to all the rights which the organisation attaches to that role. In addition, position power gives the occupant considerable control over several intangible elements of the business, which would seem to have more to do with organisational processes. For instance, a *flow of information* often belongs to a position, and power lies in the ability to regulate the flow and direction of that information. The growing importance of information to organisational decision-making magnifies this form of power. Certain positions encompass what is known as a *right of access*. This is found where the position holder gains access to an important organisational grouping or network. Merely by virtue of their position they are able to influence an important group, in a way which could not be achieved from outside the group. A further instance of position power is the *right to organise*. This is where a position embodies the right to make decisions on the nature of work undertaken and the way in which that work is organised. These factors are 'potent ways of influencing behaviour' (Handy, 1993; *cf.* Pettigrew, 1974).

To conclude, it is important to note that:

> *"Power is not an attribute possessed by someone in isolation. It is a relational phenomenon. Power is generated, maintained and lost in the context of relationships with others"* (Pettigrew, 1974).

Accordingly, any consideration of the user-IT professional relationship, must consider the relative sources of power for both parties, as well as the organisational structure and authority for IT.

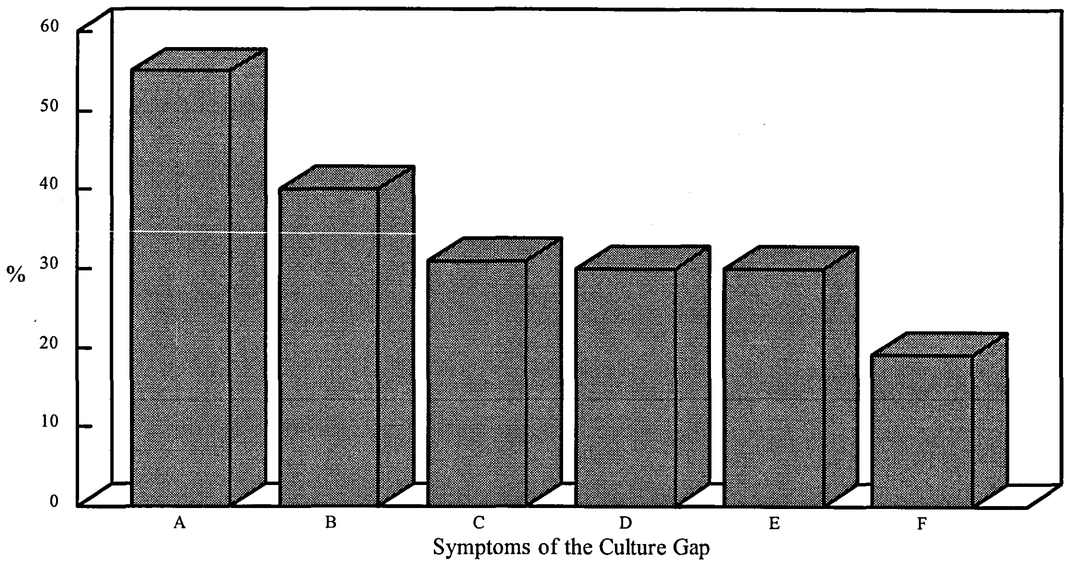
2.4.3 The Professional Versus Manager Conflict In Organisational IT

Recognising The 'Culture Clash'.

The gap between IT professionals and general managers has been recognised for some time. In a survey of 100 IT directors[6], conducted by Price Waterhouse (Grindley, 1992), 47% said that their main problem was the culture gap that existed between IT professionals and the rest of the company. Furthermore, of all the problems experienced this was the most prevalent. The general implication is that those who do not belong to the computer club are the uncultured. Further exploration revealed that 55% of IT directors believe that the culture gap is best described by the statement that management do not understand the potential of IT. By contrast, 40% of the sample recognised flaws in the IT function by stating that the gap is caused by the failure of IT professionals to appreciate the business implications of their own technology (see figure 2.3).

[6]representing a 20% sample of the top 500 companies in the UK.

Figure 2.3 - Exploring the Symptoms of the Culture Gap (IT Director's Perspective)[7]



Key

A	IT potential for business not appreciated by top management
B	Business implications of IT not appreciated by IT staff
C	Business people have difficulty understanding and appreciating the worth of IT people and absorbing them within the organisation
D	Business people have difficulty trusting IT people as one of them
E	It is not appreciated that the arguments for centralisation and decentralisation in the business differ from the centralisation and decentralisation arguments applying to IT.
F	The separation of power (vested increasingly in IT specialists) from the responsibility for results (remaining with the users)

It has been suggested that this 'clash of cultures' exists between management and all professional groupings, however,

> *"After thirty years of applying information technology in business, an overwhelming majority of companies, who live happily enough with accountants, lawyers etcetera have been unable to absorb either the computer or the computer professionals into their culture. That suggests that there is something more to this gap than just not understanding the IT jargon"* (Grindley, 1992).

Any emerging profession is bound to cause conflict because it eats into the status and authority of other managerial groups (Raelin, 1991). Once general management recognise the ability for IT (with its emphasis on the information component of work)

[7]Respondents were free to mention more than one symptom. Adapted from Grindley (1992)

to produce substantial organisational change, conflict is seen as inevitable (Newman & Rosenberg, 1985).

> *"Superimpose on this a group of technicians who are relatively well educated, possess a 'secret' language of their trade which may well be inaccessible to management actors, and a culture which is alien to the organisation, then troubles begin to inevitably accumulate"* (Newman & Rosenberg, 1985).

The apparent disparity between the goals of management and the ethos of a profession implies that the IT function does not set out with the needs of the business as its primary objective. Additionally, the nature of the job requires a level of technical proficiency, which serves to reinforce this ethos, and appears to be in conflict with the need to manage service delivery.

Sources of Power and Professionalism Amongst IT Staff

The firm foundation of technical expertise is responsible for the transformation of IT staff into professionals. Throughout recent decades, as computing technology has expanded, the skills required to exploit it have naturally mirrored its progress. A multitude of skills have emerged to satisfy the plethora of mainstream and niche developments. As information technologies become increasingly embedded in the way business is conducted (at a variety of local and global levels) the role of people who can manipulate IT is magnified. Accordingly, it is believed that the approach and mind-set of the IT experts deviates from mainstream management thinking. Several authors have discussed the technicist orientation of IT professionals (discussed in full in section 2.3; *cf.* Kumar & Bjorn-Andersen, 1990). The growth in professionalism is seen to reinforce this. In the main, the path for promotion is from a systems analyst or programmer background (Newman & Rosenberg, 1985). This is supported by the survey of job specifications (see chapter 6) which clearly showed how technical requirements are made specific, whilst other perspectives are neglected. Entry from outside the profession, by an individual who understands the organisational implications of IT, is understandably made difficult due to the need to acquire in depth technical skills. The technical orientation runs counter to the key organisational concerns of general and senior managers. This fundamental difference in values and objectives is possibly the major contributor to the culture gap.

Another contributory factor to the conflict is the role of education, critical to the diffusion of expertise. With few exceptions, approaches to training legitimise a technical emphasis by overlooking organisational aspects. Furthermore, professional expertise is locked into a technical emphasis through the development of methodologies and standardised ways of working (e.g. SSADM etc.), established by outside agencies and professional groupings. Whilst some of these techniques include components for incorporating the user, their 'involvement' is only included within a technical framework. Indeed, it has been suggested that in reality user involvement often means the 'symbolic manipulation of users' commitment to projects' (Fincham, 1994; Newman & Noble, 1990). In a similar vain, Lewis (1988) provides significant evidence that computer professionals rely on outsiders' ignorance of technical matters to evade the tasks they do not wish to do.

The ways in which most IT professionals are trained differs fundamentally from their management counterparts. As Gerpott & Domsch state,

> *"professionals are segregated from other students and fields and devote years of study to learning the technical idiosyncrasies of their discipline"* (Gerpott & Domsch, 1985)

This is in direct contrast to the messy problem solving skills managers must acquire. Earl et al. (1986) identify the need to develop new programmes for IT staff to 'meet the needs of tomorrow's organisations'. More specifically, they recommend that a management component is needed to stimulate understanding of the role of the IT function within its particular organisational area.

The value of expertise to the IT professional is reinforced by a more or less continuous skills shortage, which is the result of the demand for specialists to exploit the rapidly diversifying technology (City University Business School, 1992). The manpower limits on computing expertise make IT personnel harder to replace, increasing organisational dependence on technical staff and, QED, the potential power of IT professionals.

Further conflict is stimulated by the question of organisational loyalty (Gouldner, 1958; Blau & Scott 1962). Essentially, this is concerned with what an individual considers to be his/her 'reference point'. The tendency amongst professional staff is to mediate towards the wider, outside world of the discipline, in direct contrast to the managers' primary allegiance to his/her organisation. This is sometimes referred to as the *Cosmopolitan* versus *Local* debate. Kumar & Bjorn-Andersen (1990), supported by the earlier work of Danziger (1979), found that, in the main, IT departments are more oriented to computing issues, such as professional standards, a concern with autonomy and an indifference to costs, than to their clients. To make matters worse, on numerous occasions IT professionals are seen to show a positive hostility to the people who will use their services. This is supported by results from the survey of IT managers (chapter 4), where the dominant frustration cited by IT professionals expresses a derisory perception of users. Users are not viewed as customers, but rather a hindrance, an element which slows down the technological development being undertaken by others within the profession.

Danziger and Kraemer (1986) found that IT professionals had a preoccupation with maintaining control of their own operations and data. This reflects a strong desire to preserve the autonomy and monopoly of the IT function. In a recent case study, Stevens (1993) observed that IT professionals were strongly opposed to the proliferation of PCs. Furthermore, it was common practice for the IT function to attempt to lock users into centrally based IT and to strictly vet user requests for software, discouraging the whole practice. Several forms of power are employed to preserve autonomy, not only in technical activities, but also in control over the distributive and evaluative aspects of service provision. The argument is forwarded by IT professionals that they are the only people competent to evaluate their own services (Markus & Bjorn-Andersen, 1987; Stevens, 1993). Whilst many IT professionals may argue that the centralisation of IT differs from the arguments for centralisation and decentralisation in business (see symptom E, Figure 2.2), nevertheless, as far as users and line managers are concerned the two are synonymous. This suggests that, unlike with other professions, any gain in control by IT staff tends to be associated with a loss in autonomy for middle managers. IT professionals are effectively allied to IT. Because of the all pervasive nature of this particular form of technology, greater autonomy and commitment[8] on the part of IT staff generally has political ramifications for user groups.

In all but a few cases, the IT Function is the only provider of IT. The lack of competition means that it can exercise a good deal of expertise and resource power. For resource power to be effective there must be control of the resources, and those resources must be desired by the potential recipients. The control of information technologies tend to reside with the IT function due to their technical know-how. Commonly, this places them in the position of custodian. All technical assistance and

[8]defined as 'the furtherance or practice of one's chosen discipline'.

requests, including installation, repair and purchasing decisions, are funnelled through the IT department. They are entrusted with the authority to make such decisions by virtue of their professional position. Even where purchasing controls rest with user held budgets it is commonly the case for IT purchasing to be subject to a set of predetermined rules and 'guidelines' defined by the IT function. IT staff are not keen to relinquish control of the technology, as control is crucial to maintaining a professional status. Such an infrastructure places the impetus for innovation on a set of technical criteria derived from the IT profession and dictated by the outside influence of the technically driven computing industry (see section 1.4). Accordingly, the IT function's sensitivity to business needs is undermined.

The use, or misuse, of resource power is well documented (Hirschheim, 1985; Friedman et al., 1984; Crompton & Reid, 1983; Hedberg & Mumford, 1975). It often seems to form the last line of defence for the IT function. Newman & Rosenberg (1985) recount a number of occasions where users are forced to comply with a new system development which directly effects the way they work and in which they have had little or no input. The impetus for user 'co-operation' generally includes the removal of the old system (either manual or automated) and the imposition of the new system.

Activities which may erode expertise and resource power are not welcomed. The IT function will go to great lengths to rigidly control the IT budget. All too often this control is too excessive, the justification cloaked in technical jargon, (like guaranteeing system 'integrity' etc.). Again, the question of professional standing will inflame this situation.

Recent restructuring of the IT industry has meant a growing market in the supply of IT systems, so that business users seemingly have a range of choices for obtaining computing services, from a number of external sources. These developments are perceived by many to fragment the core operations which have traditionally formed the basis of the IT function's organisational power. However, Fincham (1994) stresses that this diluted central power does not seem to result in less power for IT professionals, rather power is transferred into a new decentralised structure. Equally, IT professionals have a wealth of externally oriented opportunities which reinforce the cosmopolitan characteristic of professionalism.

The growing importance of information as an organisational resource is widely recognised. As previously outlined (section 2.4.2), power may be gleaned from the ability to control this intangible resource. The increasing deployment and application of information technology has facilitated dramatic shifts in organisational power.

> *"To have access to information is a necessary precursor to the exercise of power and influence and computer systems may redistribute access to information. They may thus have unexpected and perhaps unwanted effects upon the power structure of the organisation"* (Eason, 1992).

In the majority of cases control of specific information has been removed from layers of middle managers, and their departments, and made available to the rest of the organisation. This may benefit the organisation as a whole as departments become better informed (Bjorn-Andersen et al., 1986). Alternatively, information becomes more centralised, allowing senior management greater control over their subordinates (Whisler, 1970; Eason, 1992) and removing influence from middle management. When considering these points, it is important to distinguish between 'managers' as part of a system of control, from 'managers' as decision makers. Whilst this does not necessarily increase the power of IT functions, it does bring them into conflict. IT professionals are seen as the *agents of change* by those who stand to lose out as the result of 'adverse' system development.

As more of a company's operations become computerised, greater emphasis is placed on the IT function to develop and manage information systems. The criteria which IT professionals bring to these tasks may influence the way in which work is organised. Effectively, this 'right to organise' work gives the IT function power. New systems may change the lines of control and authority of the workforce using them, resulting in a series of negative outcomes[9]. This may not be a deliberate or overt act on the part of IT staff, but might instead be the result of the dominant technical and economic perspective.

The shift in the access and storage of information has the added effect of making the IT function an intermediary, or gatekeeper. They have become responsible for servicing and monitoring the channels through which information flows. Any changes to these channels which the user may need, requires consultation with the IT function. The use of technology to restrict access patterns is discussed in detail by Newman (1985).

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[9]for example alienation of employees, degradation of job content, relative deskilling (see section 2.2.5) and changes in skills emphasis.

IT professionals, due to their position, are the only people eligible to sit on the plethora of IT steering and review committees. Their expertise allows them to represent information about user needs, implementation alternatives and cost benefit analyses that are self serving (Stevens, 1993; Robey & Markus, 1984). In their interactions with users, IT professionals frequently advocate a particular course of action without providing the users with the data by which they can make their own evaluations (Markus & Bjørn-Andersen, 1987).

This section has outlined some of the different ways in which power is exercised by IT professionals, albeit unknowingly, to benefit the goals of the IT function, rather than those of the whole organisation. IT professionals have created systems of control enmeshing not only staff and middle management users, but senior management as well (Stevens, 1993). These systems of control rely on a mix of expertise, resource and position power, embodied in and supported by a professional ethos. The efficiencies expected to flow from computerisation have been partially negated by inefficiencies generated by IT professionals. Furthermore, the literature suggests that with regard to IT, the case is that the profession (i.e. the technology) is an end in itself. To the IT professional, organisational goals and problems are obstacles, even mere irritations, to this.

2.5 Exploring the Propositional Relationships

So far this chapter has described, in some detail, three propositions which are used as a framework for guiding the investigation into the IT professional - user relationship.

It is suggested that a number of relationships exist between the propositions and, with this in mind, figure 2.4 (overleaf) suggests a skeletal framework or model for understanding the relationships between the propositions. The research undertaken in Chapters 4 to 8 is expected to fill in some of the connections in this framework. Figure 2.4 is revisited in Chapter 9, where it is enriched with the findings from the various research activities (see Sections 9.3 and 9.4).

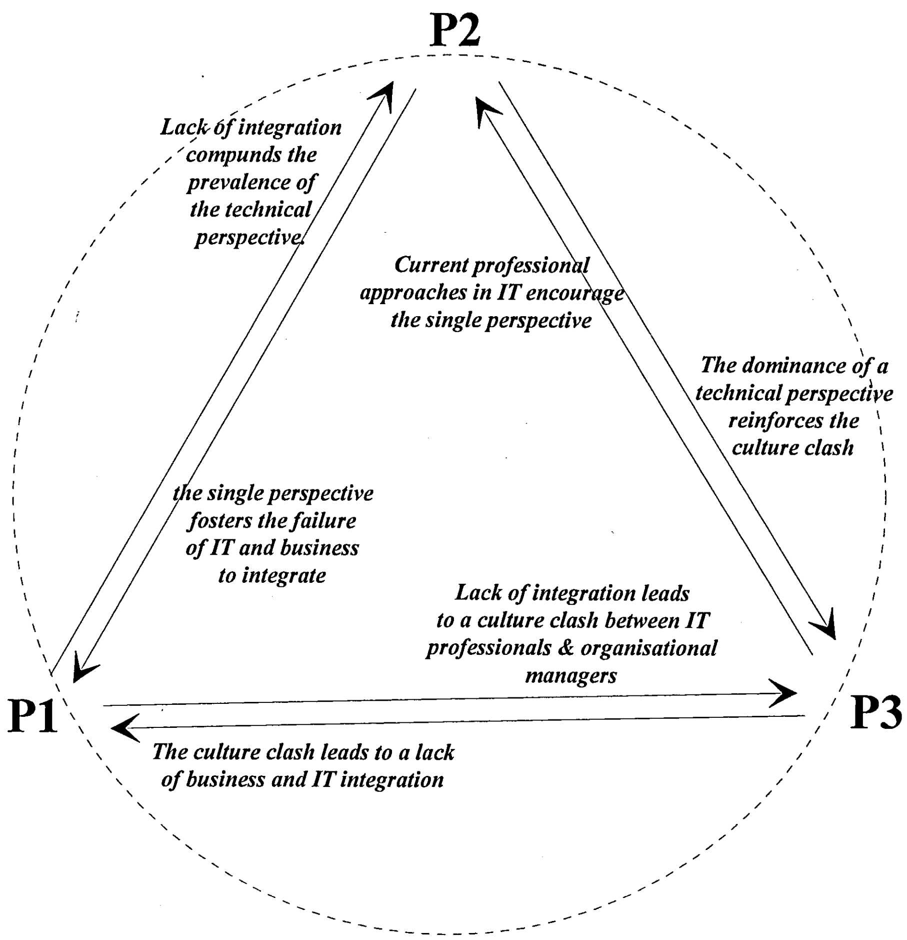

Figure 2.4 -
Skeletal Structure of the Propositional Relationships

2.6 Service Perception and Service Delivery.

2.6.1 Introduction

The purpose of section 2.5 is briefly to develop some of the key characteristics that distinguish service production from goods production and to illustrate their particular relevance to the delivery of IT support services. The significance of service management concepts and the use of service quality measures to methods of planning and managing IT is made clear. Recently, this has been highlighted as a critical area for future research (Rands, 1992; Watson et al., 1993).

2.6.2 Characteristics of a Service.

Unlike manufactured goods, the delivery and quality of a service is hard to maintain for several reasons. The following characteristics illustrate the key differences:

Tangible Versus Intangible

In most circumstances, services are predominantly intangible, unlike the creation of goods where the product itself is the tangible evidence. By contrast, services embody a range of elusive properties which are hard to define and/or quantify. This characteristic of services is also referred to in terms of the *physical* (what is provided; the product) and *functional* (how it is provided; the process) (Sasser et al ,1978; Hill, 1991). The intangible element of services generally means that an organisation will find it difficult to understand how consumers perceive their services and evaluate service quality (Zeithaml, 1981).

Simultaneous Production and Consumption

Whilst the creation and consumption of a product are, in the vast majority of cases, divorced activities the production and consumption of many services are inseparable (Parasuraman et al, 1985). Put simply, the benefit (or utility) of a service to the consumer occurs at the very point that the provider delivers the service. It is not feasible to stockpile services as would be possible with goods, so services may take on a perishable quality. Consequently, quality occurs during the process of service delivery. This is further compounded by the interaction between the service supplier and service consumer. Due to this simultaneous production and consumption, the consumer's input in defining the particular service required fundamentally influences the process of service delivery and, as a result, service quality.

Contact

Another difference between the production of a good and the provision of a service lies with differences in 'contact'. Contact can be defined as the interactions between consumers and service providers, and Zeithaml et al (1988) maintain that service quality is determined by such consumer/provider contacts. The crucial attribute of this contact rests with the human qualities. In support of this, Parasuraman et al (1985, 1988, 1991) discuss these human qualities as determinants of service quality[10].

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[10] Parasuraman et al. propose ten criteria in their initial service quality model (1985) which is later refined to five groups for the purpose of application to the SERVQUAL 'tool' (1988; 1991).

The interaction between consumer and provider is made more complex when the *process* of interaction is considered. Larsson and Bowen (1989) have identified an important element of the interaction process which they call "Co-production". This suggests that there is significant value in the process of feedback which takes place when consumers make contributions to *producing* services. This suggests that the nature and degree of contact plays an important role in determining service quality. To this end, Larsson and Bowen categorise services using two criteria; diversity of demand, and Customer Disposition to Participate. The following diagram illustrates this:

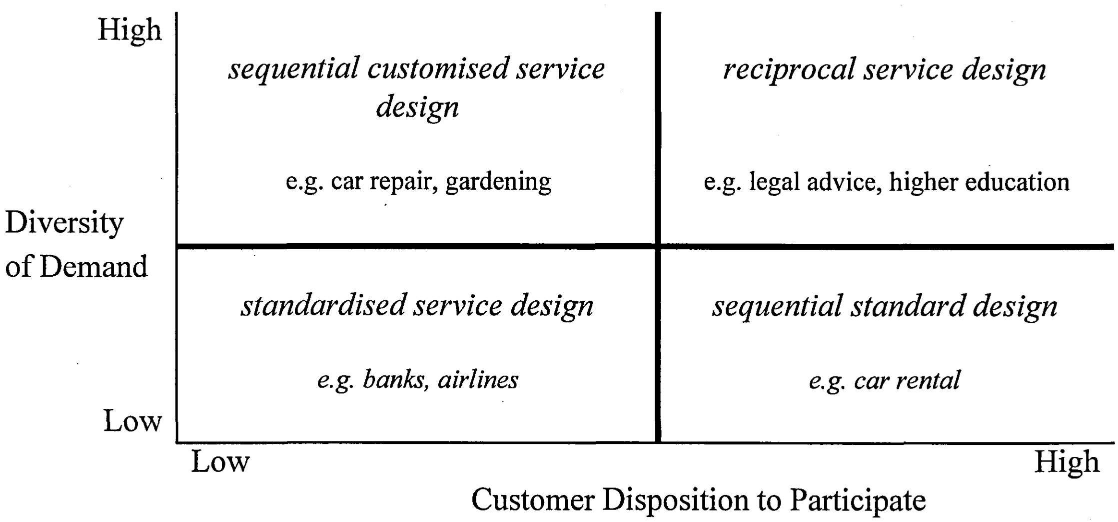

Figure 2.5 - Consumer Interaction in the Service Process

This diagram is of particular interest because it shows that as demand diversity increases there is a propensity for services to become customised, rather than standardised. This implies that the role of the consumer greatly influences the nature of the service. The relevance of this section will be self-evident when applied specifically to IT support services.

Lack of Uniform Quality in Service Delivery

The consistency of behaviour of service personnel (i.e. uniform quality) is difficult to guarantee. Parasuraman et al, 1985, refer to this phenomenon as *heterogeneous* performance. As mentioned previously, the delivery of a service relies heavily on the interaction of producer and consumer at the point of service production. Naturally, this situation places great emphasis on the role of the service provider and the qualities they may instil in their role. Several difficulties result from this scenario. Firstly, the quality of service provision can vary considerably from one provider to the next. Secondly, the qualities of the service provider may fluctuate over time, and thirdly, service quality may vary in response to the different characteristics of consumers. All of these factors can combine to make the task of assessing and maintaining service quality complex.

At this juncture, it is important to note that evaluations of quality are not made entirely on the outcome of a service, but rather on a combination of the outcome and some evaluation of the process of service delivery (Rands, 1991; Parasuraman et al, 1985; Zeithaml, 1981).

2.6.3 The Service Characteristics of IT Provision

This section aims to illustrate the service characteristics of IT support and to place it within this context.

Tangible Versus Intangible

The traditional (or orthodox) perception of information technology provision, as held by the computing professions in particular, has been dominated by a distinct and somewhat blinkered focus on the product. Several of the reasons for this were examined in part one[11]. In recent years, this over-emphasis on the tangible has begun to be counter-balanced by a greater recognition of the intangible qualities, i.e., how IT is provided as well as what is provided. Much research and practitioner effort has been spent considering these functional aspects for a variety of reasons, most notably:

- A response to system "failures" throughout the 1980's (Ewusi-Mensah & Przasnyski, 1991)
- A response to user dissatisfaction (Allingham & O'Connor, 1992; Lawless & Price, 1992; Moad, 1989; Bailey & Pearson, 1983)
- A response to the failure to justify adequately the expenditure on computing in economic terms (Clemons, 1993; Mirani & Lederer, 1993; Symonds, 1990, Sassone & Schwartz, 1986)

Together, these aspects provide significant grounds for seeing IT as providing mainly a service rather than a physical good.

[11]Of most bearing is proposition 2, that a technical and economic perspective prevails in technology management with little or no consideration of other perspectives. This is reinforced by proposition 3 concerning the professionalism and culture surrounding IT staff.

Simultaneous Production and Consumption

The service characteristics of information technology support activities are further illustrated through a general emphasis on simultaneous production and consumption. It is not feasible to supply the user with IT as a separate 'act', removed from other key factors. To elaborate, the process of IT assimilation by users (and collectively the organisation) is composed of several elements. Briefly, these are the technology itself (provision of hardware, software, etc.); training and education (to facilitate the exploitation of the technology); troubleshooting and support requirements (problem solving and assistance 'on request'); and maintenance of facilities (as both cure and prevention).

Whilst the tangible element, the technology, can be implemented without the need for interaction with the user, the situation for the remaining elements is somewhat different. In providing support activities IT staff require a significantly high level of interaction with the user. Whilst users often have little or no control (or interest) over the technological make-up of the service, they do determine what is required and how this requirement is to be met. This may occur in two ways. First, as a *proactive* involvement with a high level of contribution and feedback from the user, who is able to specify their requirements and steer the support process. Second, in a *passive* fashion, where the user has a low level of technical expertise and cannot suitably articulate his/her requirements. The degree to which a user feels able to participate is discussed below.

Naturally, this scenario places considerable pressure on the contact between the two parties.

Contact

The previous paragraphs have outlined why, by their very nature, IT support activities demand a high level of contact between users and IT support staff. In essence, IT support activities should be seen as *Contact Orientated.*

Furthermore, certain characteristics of the IT function-User relationship directly influence the requisite service delivery criteria. Two characteristics are of particular note; the diversity of demand and the customer disposition to participate, embodied in the process of interaction and feedback, discussed previously. The importance of assessing where an individual or group of users are positioned with respect to these criteria becomes paramount, as it will effect how the IT support function should manage their response.

To elaborate, the term 'diversity of demand' refers to the uniqueness of user demands. This falls into two categories:

- *the diversity of support requested by a single user*, manifested either as the complexity of a single request, or the variety of requests over time

- *the divergence of support requested by a user populace*, i.e. the extent to which support services have to be customised from one user to the next.

'User disposition to participate' refers to the extent to which users become actively involved in the support process. The level of participation is raised by:

- *a greater reliance on users to articulate or describe their problem,* for example, where an application requires detailed business or organisational knowledge which, for obvious reasons IT staff do not have, but must take into consideration if the application is to be successful.

- *the degree to which users feel that their active involvement is necessary* in order to guarantee service quality. This is affected by the degree to which a user feels 'at home' with the technology (tolerant of technical change), their level of knowledge and understanding of IT, and an awareness of the role they can play in providing relevant feedback during the support process. This last criteria corresponds to Larsson and Bowen's notion of "co-production" referred to earlier.

Oliver and Langford (1987) believe that a number of myths exist about users, which are generally held by IT service providers. These encompass several of the issues mentioned earlier in this chapter, but particularly user uncertainty over what they want and a perceived tendency to always be changing their minds. This is in direct contrast to the working practices of IT professionals. Furthermore, they contest that these 'myths' become self-fulfilling prophecies which inhibit greater degrees of user participation.

The following diagram (figure 2.6), attempts to illustrate the demand and participation criteria, with specific reference to the case for IT support:

Diversity of Demand	Low — User Disposition to Participate	High — User Disposition to Participate
High	**Customised Support** *characterised by:* *complexity of the support request, but satisfied by the actions of the IT support staff.* *due to :* *level of discretionary usage, but user input restrained by an inability to articulate their requirements.*	**Reciprocal Support** *characterised by:* *iterative process - lots of feedback from users coupled with discretionary demand, hence high diversity.* *due to:* *high level of understanding and change acceptance.*
Low	**Standardised Support** *characterised by:* *uniformity (and simplicity) in range of support requests in conjunction with users who are unable to contribute to the support process.* *due to:* *barrier of technological acceptance and understanding on the part of the user, limited recognition of the application of IT to work tasks.*	**Participative Support** *characterised by:* *low diversity, but user willingness to drive forward the support process.* *due to:* *technology tolerant and change acceptant user keen to develop own understanding, but constrained by the limited bounds of their work role.*

Figure 2.6 - User Interaction in the Service Process

The wider the range of user demands for support and the greater their disposition to participate can only result in uncertainty, on the part of the IT function, as to what services they will be required to deliver. To summarise, this suggests that as users needs and abilities become more complex the IT support function must respond accordingly.

It is anticipated that the overall culture of an organisation may play a positive, enhancing role on the process of interaction. Where an organisation embodies a 'change acceptance culture' and is consciously striving to manage change effectively individuals within the organisation will feel more at ease (or less threatened) with applying IT to their role and encouraged to participate and innovate.

Moriarty and Kosnik (1989) discuss the uncertainty which surrounds the application of any new technology where developments frequently occur. This uncertainty makes needs appraisal more complex and hampers user understanding of the needs the technology may satisfy. This mat cause problems for staff and users alike in that the process of communication is hampered by the inability of both parties to conceive and articulate the opportunities the technology offers. Obviously, this has implications for proposition 3, that a culture clash exists between IT professionals and organisational management, with respect to both the service delivery and service receipt studies in chapters four to eight.

Lack of Uniform Quality in Service Delivery

IT support services generally place great emphasis on the contact between users and support staff. The significance of this contact, and the subsequent importance of the human to service delivery, results in a lack of uniform quality. In order to 'minimise' the lack of uniform quality it becomes necessary to find some way of (accurately) assessing both the outcome of the service and the process of service delivery. However, as Rands points out:

> *"It may be easier for users to assess functional rather than technical quality of an IT service, but difficult for IT specialists to measure functional quality; therefore mismatches may concern the perceived relevance of technical and functional elements in the IT service" (Rands, 1991).*

2.6.4 Current Thinking

In recent years several authors (most notably Kyu Kim, 1990; Rands, 1991. 1992) have begun to consider the relevance of service delivery issues to IT services. Taking this notion a stage further, Rands attempts to create a conceptual framework for IT service delivery, based on the general model proposed by Parasuraman et al (1985).

> "*To avoid mismatches between customers and service producers, therefore, customers' perceptions of service products should be understood when service delivery systems are designed*" (Rands, 1991).

Rands makes several recommendations for future research, most notably, research into the value of using service quality type measures (for example, SERVQUAL) for user satisfaction with IT applications, and a detailed study of IT service dimensions. When such avenues have been explored, 'it may be possible to evaluate the potential value of these approaches to managing IT. After this new methods of managing IT may emerge' (Rands, 1991). Most recently, Watson et al. (1993) highlighted the urgent need for research into user satisfaction and service quality.

The application of service management concepts to IT is explored more fully in Chapter 7 (Section 7.2). The use of SERVQUAL, as a specific measure of service concepts, is described in Section 3.5.2 and its operational use is explained in section 7.3.

2.7 Summary

This chapter develops a set of research issues and objectives in response to the issues raised in Chapter 1. These are transposed into a set of propositions. The literature presented in this chapter has been structured so that it develops this propositional framework, reflecting some of the current IT related concerns. The propositions are designed to provide different perspectives for use in designing the research activities, discussed in Chapter 3. However, the propositions are not to be seen as mutually exclusive. Propositional arguments may overlap. Certain issues are prevalent to two or more propositions. For example, the technical orientation of IT professionals effects their system design decisions (Proposition 2) whilst reinforcing their specialised skills and expertise power (Proposition 3). Section 2.5 presents a skeletal framework or model for understanding the relationships between the three propositions.

Chapter 3 bridges the gap between the current literature and the research activities presented in this thesis. However, it is important to note that the propositions are not used in a traditional sense, but rather as criteria for guiding the investigation into the IT professional - user relationship, and its importance to adoption and assimilation.

Finally, section 2.6 presents the service delivery related literature which develops the service concept outlined in Chapter 1 and provides explicit justification for the service delivery questionnaire conducted in Chapter 7.

CHAPTER THREE

The Research Design: Theoretical Requirements and Practical Constraints

3.1 Introduction

The purpose of the research has been to explore the IT staff - user relationship. With this in mind, a set of propositions was developed as a means of enquiry (see chapter 2). This chapter discusses the translation of the propositions into a viable set of research activities. The use of the propositions helps to clarify and focus each activity as well as inspiring much of the design.

Sections 3.2 to 3.4 describe the design of the research, from a methodological standpoint through to the formulation of the five specific research activities. In the light of a number of methodological considerations (see section 3.2) a research design framework is described which contains both qualitative and quantitative approaches. Finally, Section 3.5 provides an outline of the key techniques used to interpret and represent research activity data.

3.2 Methodological Standpoint

In this section an attempt will be made to place the approach taken in this thesis within a broader methodological framework. In doing this, it is first of all necessary to outline the typical methodological approaches, *deduction* and *induction*, and more specifically *grounded theory* approach to qualitative analysis.

3.2.1 Background

Deductive methods are generally regarded as the scientific approach to the solution of problems (Alt & Brighton, 1981). Initially, a set of hypotheses is developed in advance of any data collection. The hypotheses arise as the result of current theory in a particular area and testable predictions are derived from those hypotheses. The next step is to design a research activity which is able to test them. Where applicable, confidence levels and sample sizes are established before the research activity is implemented. Once the data has been analysed the results are compared with the expectations of the hypotheses and the hypotheses are, to a greater or lesser extent, proved or disproved (Cohen & Manion, 1980; Alt & Brighton, 1981; Silverman, 1993).

By contrast, inductive methods[1] place greater emphasis on the process of data collection and analysis. In the initial stages data is collected within the bounds of a particular problem focus, but without any clear-cut hypothesis in mind. During analysis the researcher looks for relationships, connections and trends between different elements. Hypotheses emerge or are induced from the analysis. The process of analysis and hypothesis formulation is often iterative. Unlike deductive methods, hypotheses and conclusions follow on from the data instead of being set out in advance (Selvin & Stuart, 1965; Alt & Brighton, 1981; Lawrence, 1982). The most notable inductive approach to qualitative data analysis is *grounded theory*, first proposed by Glaser and Strauss (1967). The focus of the analysis is not just on data collection, but on the organisation of the ideas (and theories) which have arisen from the analysis (Strauss, 1987). The focus of the approach is clearly on 'the discovery of theory from data' (Bryman and Burgess, 1994). A full discussion of the approach can be found in Glaser and Strauss (1967), Turner (1981), Strauss (1987), Strauss and Corbin (1990).

Deductive approaches have a tendency to constrain the researcher to assessing the hypotheses under investigation and tend not to allow for unforeseen developments. Whilst this is by in large acceptable in science it is not so relevant to social science where it is necessary to understand the interactions and change process associated with individuals and organisations. Furthermore, in relatively new areas of study there is often a sparsity of theoretical development which makes a deductive approach particularly problematic.

> *"The time for the formulation of hypotheses varies with the nature of the problem and the extent of prior knowledge about it"* (Selltiz et al., 1959)

and as a result,

> *"Practical survey researchers have escaped from the corset of the hypothetical-deductive model for gaining knowledge by realising that, in many cases, no adequate theory exists for setting up hypotheses in advance.*

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[1] Also referred to as 'exploratory methods' by Katz (1965)

Exploratory studies enter new ground with new and unknown complexities" (Lawrence, 1982)

Inductive approaches have also been criticised. Alt and Brighton (1981) dispute the 'untested conclusions' and general lack of scientific rigour which they see as part and parcel of inductive methods. More explicitly, Bulmer (1979) questions whether it is feasible for a researcher to suspend their awareness of relevant theories and concepts and, referring to grounded theory in particular Silverman (1993) states:

> *"Grounded theory has been criticised for its failure to acknowledge implicit theories which guide work at an early stage. It is also clearer about the generation of theories than their test. Used unintelligently, it can also degenerate into a fairly empty building of categories"* [rather than] *"an approximation of the creative activity of theory-building found in good observational work"* (Silverman, 1993).

With specific reference to information systems research, Galliers (1992) considers the range of approaches that have been advocated as being suitable. A useful distinction is made between scientific (or empirical) approaches and interpretivist approaches. Scientific approaches, characterised as analytical, assume that observations of phenomena under investigation can be made and measured objectively and rigorously. Furthermore, Bleicher (1985) maintains that what cannot be investigated using this approach, cannot be investigated at all scientifically. By contrast, interpretivist approaches argue that the scientific ethos is misplaced in social scientific enquiry because of the possibility of different interpretations of social phenomena, the impact of the researcher on the social system under investigation, and the uncertainty associated with predicting the outcome of any human activity (Checkland, 1981). As Galliers concludes:

> *"Information systems researchers are becoming increasingly aware of the limitations of the scientific approaches to their work, given the socio-technical nature of their chosen field"* (Galliers, 1992)

All of these observations and criticisms should be born in mind when considering the following sub-section.

3.2.2 - Methodological Setting for the Use of Propositions

The methodological approach taken in this thesis consciously falls between the deductive and inductive extremes. As was previously stated in chapter 2, the use of a set of propositions is as a means of enquiry, rather than as hypotheses to be "proved" or "disproved". Accordingly, there is a need to preserve some degree of flexibility with the propositions. They should be seen as *pointers* rather than *blinkers*. The benefit of adopting this approach is that it enables <u>some</u> of the characteristic structure and focus of the deductive approach, whilst allowing considerable inductive scope.

In summary, the aim is to realise the positive attributes of deduction and induction by using the propositions to *guide* the research, but using qualitative analysis to enable rich pictures to emerge. The propositions should not limit the enquiry, but rather they should help with the exploration process.

Adopting this approach means that it is possible to address the research from a number of different perspectives and to investigate from several, alternative but complementary, angles. The different perspectives embodied in the propositions are encompassed in the design of individual research activities.

A further consideration of this approach is the need to balance the richness of qualitative data, with some of the accuracy, and more global, aspects of quantitative data. Again, such considerations are taken into account in elements of research activity design. The range of research activities endeavours to take on board the distinction between the scientific and interpretivist approaches, discussed in the previous section.

3.3 Information Requirements

Basically, the information needed for this thesis falls into two distinct categories; the formal dimension and the qualitative dimension. The two types of information are complementary and will serve to reinforce and support each other.

The Formal Dimension

The formal dimension comprises the following groups:

a) *Background setting* (organisational structures and descriptions, technical infrastructure etc.),
b) *Descriptions of individuals* (job title, organisational position, employment history and so on),
c) *Recruitment policies* (as stated requirements),
d) *IT services used by users* (as stated fact).

This dimension can be seen as 'objective' in that it portrays information which is not derived from the subjective attitudes of individuals.

This involves obtaining data from a variety of sources. The data is located in documents, preliminary meetings and questions from questionnaires. For example, the service delivery questionnaire (chapter 7) included certain questions which recorded the IT services respondents actually used and two identifiers recorded organisation position and section. Prior to this an initial meeting with senior staff provided the background setting.

The Qualitative Dimension

This represents the body of information that will help in understanding the attitudes, perceptions and beliefs of certain groups of key 'actors', i.e. people involved in the IT staff - user support relationship.

The data is located in the thoughts and/or written opinions of individuals gained by means of either semi-structured questionnaire (with open-ended questions) or face to face interviews following a semi-structured design.

3.4 The Framework of Research Activities

The research activities are structured so that they address the two sides of the IT staff - user relationship. Three activities focus on different aspects of IT delivery, whilst two activities address aspects of the service receivers. Figure 3.1 provides an overview of the activities undertaken.

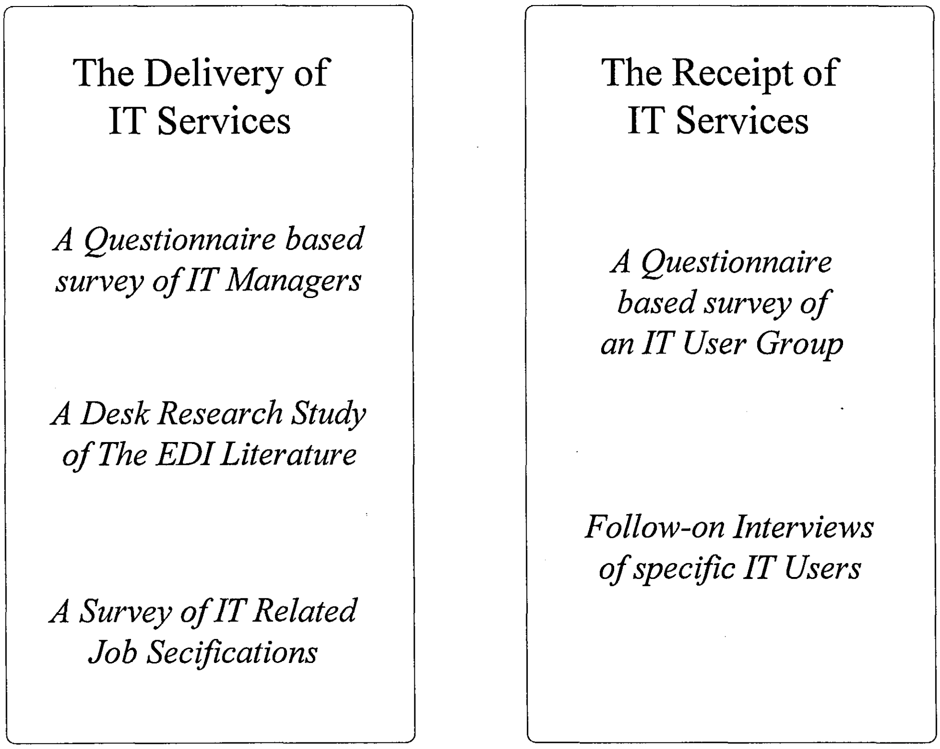

Figure 3.1 - Overview of Research Activities

The study consciously attempts to combine the benefits of deductive analysis, by using the propositions to structure and target the investigation, with the positive features of a qualitative approach, in searching for a richness in understanding and allowing this to emerge from the subjects of the study.

Thus, when considering the providers of the service, the range of methods used not only explores the perceptions and attitudes of managers in a qualitative way, it also examines the criteria for the selection of managers as specified formally in a job description, and considers some aspects of their professional output in the form of publications. In doing this, the research design strategy aims to bring out aspects that cover input criteria (recruitment survey), process activity (perceptions of managers) and output measures (publications typology). The left-hand column of figure 3.1 summarises this point.

3.4.1 The IT Professional Side: The Service Deliverers

In no way do these three activities attempt to address the three propositions independently, as it is apparent that many of the propositional arguments overlap and in practice are hard to separate out. However, figure 3.2 attempts to shed some light on the nature of the relationship between the service delivery activities and the guiding propositions.

	Lack of Business & Information Technology Integration	*Dominance of a Technical & Economic Perspective*	*Conflict of IT Professionals and Organisational Management*
Survey of IT Managers	★	★	★
Literature Perspective Study	○	★	○
Survey of Job Specificat-ions	○	★	○

Star : the study is directly concerned with a proposition.
Circle : the study is not directly concerned with a proposition, but leads to related findings.

Figure 3.2 - Overview of How the Propositions Relate to Service Delivery Activities

The Survey of IT Managers (chapter 4)

This study was implemented to:

1. gain insight into the perceptions, attitudes and values which IT managers hold with regard to their jobs,
2. the range of perceptions for certain key issues, and to
3. investigate some of the reasons why attitudes to the delivery of IT services may differ.

The choice of method was determined by a number of factors. The survey had to draw on a broad set of responses i.e., the number of respondents should be great enough to elicit (close to) the full range of responses. Accordingly, a suitable spread of respondents was required. This places sampling constraints, in terms of industry sector, on the study. Also, a large enough, representative sample could not be obtained from within the local vicinity. These factors, when combined, suggested that a questionnaire is the only viable approach. The only alternative method for conducting a perceptual study of this nature, the interview, would be very expensive and would have proved too time consuming, both in terms of setting up and conducting the interviews.

The need to elicit perceptions and attitudes requires that answers have a certain quality and richness which cannot be gained from quantitative questioning alone. Furthermore, this study represents more of an inductive process. Certain avenues of enquiry are suggested by the propositional framework, however, the questionnaire does not represent a vehicle for testing the propositions. Accordingly, respondents need to be given a free rein to give detailed answers in their own words. To best fit these requirements it was decided that a semi-structured questionnaire should be designed, where the questions are directed towards issues raised by the propositions. Question design and development is described in chapter 4.

Sample selection was done by use of an up to date mailing list which focused on IT managers from a wide variety of organisations in the UK with turnovers in excess of £50,000 per annum, or equivalent. Any bias which developed in favour of a particular industry sector was corrected by targeting specific sectors which were under-represented to allow for a complete picture. Implementation centred on mailing a copy of the questionnaire, complete with covering letter and completion instructions, to every manager in the sample. Follow-up letters were issued where applicable. Again, this full procedure is discussed in more depth in chapter 4.

Study of the EDI Literature (chapter 5)

This study was undertaken to address the concerns of Proposition 2, namely that there is a dominance of a technical and economic perspective in technology management, with little or no consideration of other influences. Consequently, this influences the way in which IT professionals view their roles and define, perceive and discharge their duties.

Not only does the literature represent the output of current thinking and practice in a particular area, it also acts as an input by informing future thinking and practice. In this way, it is believed that a study of a particular block of literature will reveal insights into the motivations and perspectives which dominate information technology management.

The need to focus on a form of documentary evidence dictated the method used and the approach to analysis. Consequently, this study was conducted as a piece of desk research. A specific body of literature was acquired pertaining to a particular form of IT. Accordingly, Electronic Data Interchange (EDI) was selected on the basis that it characterised, at the time of study, a 'current innovation in information systems'. Citation indexes and library cataloguing systems were used to identify a sufficiently large enough literature sample. These were examined using content analysis to identify certain attributes which are associated with the propositions. The implementation of this study lends itself to longitudinal analysis, allowing changes over time to be detected.

The Survey of IT Related Job Specifications (chapter 6)

This study was undertaken as a way of understanding:

1. the criteria by which IT personnel/professionals are selected,
2. how their work roles are defined (terms of reference), and
3. what work task IT staff are expected to do and the emphasis of these tasks, with respect to the propositions.

A form of document analysis was used where the job specifications for information technology related positions were analysed. The sample was obtained by responding to advertisements in a series of national publications from April to October 1992. A corresponding sample was taken for a similar time period in 1993, which enabled a limited longitudinal analysis to be undertaken.

Document analysis makes it possible to obtain a reasonably comprehensive picture of a large variety of IT related positions from a representative sample of organisational types. This approach is also beneficial because it targets current vacancies i.e., positions to be filled, at the time of study, rather than existing work roles which may have been specified several years ago. Furthermore, data collection is made straightforward, whilst the job specifications provide all the necessary information.

This method lends itself to repetition making a longitudinal study viable. Once the criteria for analysis have been determined the actual process of analysis does not require much time. In addition, practice has shown that this form of activity can be run simultaneously with other research activities.

3.4.2 The User Side: The Service Receivers

User Perceptions of Service Delivery and Quality (chapter 7)

The purpose for conducting this survey is to understand better what issues computer users perceive to be important in the delivery and quality of the information systems and services which they use.

The potential for viewing IT support in terms of service provision is thoroughly explored in chapter 2. This suggests that user attention should be focused on the service element of IT. The need to gauge the attitudes and perceptions of users as service recipients meant that there was a need to focus users on the support services they receive rather than on specific technologies. With this in mind, it was considered best to use elements of a tried and tested service delivery model (SERVQUAL) for part of the study.

Prior to conducting the study it was necessary to understand the organisation. A series of meetings was arranged with three senior management figures to learn more about how the organisation functions, how it is structured internally, and what changes to the working environment have taken place within the last year. It must also be noted that the author had considerable experience of the target organisation as a former employee.

Given the need to question a relatively large number of users within a single organisation the most practical approach was to develop a self-completion questionnaire. As such a questionnaire must generate the required data on its first application to a *real* scenario, it was necessary to work through an elaborate piloting and assessment procedure to ensure the desired responses were obtained. The piloting process will be discussed in more depth in section 8.3.

The survey was eventually conducted inside two organisations. The results from the second organisation can be found in Appendix G. The length of time required to build up enough background understanding and a working relationship with key personnel, coupled with the financial costs associated with a study of this nature, limited the number of organisations. Five organisations were initially approached resulting in the two positive responses.

The Follow-on Interviews (chapter 8)

The purpose of this phase was to build on the service delivery questionnaire (chapter 7) and to further the understanding of the culture and organisational context. Essentially, the aim of chapter 7 was to provide a breadth of understanding whilst the interview phase is designed to generate a depth of understanding. This requires that interviewees be allowed as much freedom to give answers as they need, whilst steering these answers so that they address the salient issues. Neither the two extremes of structured or unstructured interviews satisfy these requirements. Consequently, the most suitable approach is a semi-structured interview technique, in particular the standardised open-ended interview. As Stone (1984) states:

> *"This* [standardised open-ended interview] *approach is a useful one when the questions which need to be asked can be formulated in advance but when greater flexibility of response is required"*

The strengths and weaknesses of this approach, are discussed in full in section 8.2.

3.5 Methods of Representation and Interpretation

This section outlines the methods used during the interpretation of research activity data and the techniques employed to present the analysis.

3.5.1 - Content Analysis

The purpose of this section is to describe the processes by which each completed questionnaire was analysed and subsequently coded. In particular, it details the technique of content analysis.

Various authors have proposed formal definitions of content analysis. Most notably, Stone et al. (1969) state that:

> *"Content analysis is any research technique for making inferences by systematically and objectively identifying specified characters within text".*

Krippendorff (1980) defines the method as:

> *"Content Analysis is a research technique for making replicable and valid inferences from data to their context".*

This means that, for most researchers, content analysis is a research methodology that utilises a set of procedures to make valid inferences from written and/or verbal communications.

Its extensive use in a wide variety of fields and disciplines reinforces its applicability to this study (Marshall & Rossman, 1989). Berelson (1952) provides examples of the many purposes for which content analysis has been used. Of particular relevance are:

- to aid in technical research operations (to code open ended questions in survey interviews) ;
- to reflect attitudes, interests and values (cultural patterns) of particular population groups ;
- to reveal attitudes and interests of individuals and/or groups.

Several factors make content analysis suitable to this study. These are its ability to:

(a) *analyse and compare all responses*, rather than just being limited to the responses of individuals, i.e. it allows for the analysis of groups of 'like' statements across the entire set of respondents;

(b) *glean extra worth from qualitative data,* above and beyond a 'traditional' analysis of open-ended questions;

(c) *elicit information discretely,* which the respondent would not give you if directly asked. e.g. it is context sensitive.

(d) *elicit some symbolic meaning,* from the qualitative answers but only within the framework :

- <u>propositions as means of enquiry</u> - statements, as communications, do not necessarily have a single meaning, e.g. data can always be looked at from numerous perspectives, especially when they are symbolic in nature (Krippendorff). Consequently, this study has not analysed *the* content of statements in its entirety, but part of it. This 'selectivity' has been achieved by viewing statements through the framework of propositions, outlined previously in chapter 2.

- <u>common target</u> - the meanings of statements may not necessarily be shared i.e. consensus only exists where obvious aspects exist, or where people share the same social, political or cultural perspective (Weber, 1985). Any content analysis must be performed relative to and justified in terms of the context of the data. With this clearly in mind, a comparable group of IT managers, was selected as the common target for the questionnaire.

It is important to note that the application of content analysis should be as a tool to supplement and reinforce qualitative analysis of respondents' answers (Weber; Krippendorff). Much of the relevance and value of this methodology is lost when used in isolation.

3.5.2 Service Delivery Models (SERVQUAL)

The applicability of service delivery and quality ideas to the domain of information technology has been examined in some depth in chapter 2. This application becomes more germane when the focus of attention is IT support services. Accordingly, service delivery and quality concepts offer themselves as suitable vehicles for ascertaining user perceptions of the support services they receive.

Background to the SERVQUAL Instrument

Parasuraman, Zeithaml and Berry (1988) describe SERVQUAL as 'an instrument for assessing customer perceptions of service quality in service and retailing organisations'. It is based on their earlier conceptual model of service quality (Parasuraman et al., 1985) and was developed as a practical step in the operationalisation of the model (Parasuraman et al., 1988; 1991). Their research offers a model of service quality which is made up of five dimensions. These are:

Tangibles:	Physical facilities, equipment and appearance of personnel.
Reliability:	Ability to perform the promised service dependably and accurately.
Responsiveness:	Willingness to help customers and provide prompt service.
Assurance:	Knowledge and courtesy of employees and their ability to inspire trust and confidence.
Empathy:	Caring, individualised attention the firm provides its customers.

Using these dimensions a battery of questions was developed, assessed and refined resulting in the 22 question instrument associated with SERVQUAL. Customers are presented with these questions and asked to state what *expectations* they have of a given service with respect to each question by marking a 7 point Likert scale, ranging from 'strongly agree' to 'strongly disagree'. This process is repeated with the same customers to ascertain their *perceptions* of the same service with respect to a particular service provider. The difference between expectations and perceptions is taken to represent the quality of the service provided. The practical application of SERVQUAL has been wide-ranging, most notably in business services (Finn and Lamb, 1991; Webster, 1989; Brown and Swartz, 1989) and health care (Walbridge and Delene, 1993; Woodside et al., 1989; Babakus and Mangold, 1989). However, to date it has not been applied to the service quality of an IT support department. This possible application was originally suggested by Rands (1991, 1992) and later reiterated by Watson et al. (1993).

SERVQUAL's Applicability to a Study of IT Users

SERVQUAL has many attributes which recommend its inclusion in a study of IT support service users.

a) It clearly addresses issues pertinent to the service 'customers' (in this case the users) rather than the service deliverers. The content, style and framing of the questions is not hostile to the service recipient's perspective. Attention is also directed at the point at which service is delivered.

b) SERVQUAL has a perceptual focus, i.e., the nature of the questions asked are geared to elicit user perceptions of the service. This will help to satisfy some of the elements of the information requirements specified previously.

c) The combination of questions is specifically designed to direct attention to a whole series of service related issues, the intangibles, as well as the more usual technology focus, the tangible element.

d) SERVQUAL provides a practical 'bridge' from the conceptual theory to a real world scenario.

e) SERVQUAL, through its reliance on a set of Likert scales, provides a quantifiable measure to complement the qualitative questions used in the questionnaire.

Methodological Considerations

In recent years a number of methodological observations have been made concerning the SERVQUAL instrument (Babakus and Boller, 1992; Parasuraman et al., 1993; Carman, 1990; Brown, Churchill and Peters, 1993). These are concerned with various aspects of its design and implementation.

Doubts have been raised over the use of the five service quality dimensions. The focus of attention is whether service quality can be reduced to just five dimensions, what these dimensions should represent and whether it is reasonable to assume that they will be generic for a wide range of service delivery experiences. Indeed, the findings of a study undertaken by Babakus and Boller (1992) recommends that:

> *"The dimensionality of service quality may depend on the type of services under study"* (Babakus & Boller, 1992)

Carman also concluded that:

> *"These dimensions are not so generic that users of the scales should not add items on new factors they believe are important in the quality equation"* (Carman, 1990)

Another area of concern has been the wording of specific questions. Again, it becomes apparent that the wording of individual questions cannot always be generically applied. Different service situations require alternative question formats to make SERVQUAL applicable. Carman encourages SERVQUAL users to develop new questions to suit new environments and not to be concerned about omitting questions that testing has shown not to be relevant to their situation. He concludes:

> *"The lesson learned is that while PZB[2] items provide a start for item development, all items need to have validity and reliability checks before commercial application"* (Carman, 1990)

With this in mind, a rigorous piloting procedure was followed (see chapter 7).

Probably the most fundamental methodological consideration raised by a number of SERVQUAL analysts is the use of 'gap' scores, i.e., where the gap between

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[2]Commonly used abbreviation for Parasuraman, Zeithaml and Berry.

expectations and perceptions are measured. The calculation of gap scores assumes that expectations and perceptions are independent, however, it is reasonable to expect that perceptions of quality are influenced by expectations. This situation is more likely to be found in the IT user setting where users generally only experience the one service delivery group. Hence, their perceptions will be linked to their limited expectations. Expectations are limited by their experience of alternative service deliverers, rather than any alternative limitation.

Babakus and Boller also stress a number of psychological constraints affecting the way respondents answer scale questions. This makes the use of gap scores problematic.

From a practical standpoint, the repetition of questions, first phrased as expectations then as perceptions, proves extremely off-putting for respondents. The original 22 questions require respondents to complete 44 separate Likert scales, with similarly worded expectation and perception questions. This possible misunderstanding, coupled with the excess time it takes to answer the enlarged set of questions creates further problems (Lewis and Mitchell, 1990). Consequently, it was decided not to employ the 'expectation' questions, but to focus instead on user perceptions. An alternative open-ended question was included in the questionnaire to better understand expectations by addressing the elements of the service that were adequate or not adequate and why.

In the light of the points mentioned above, several adaptations were made to the questions eventually used in the final questionnaire. An iterative piloting procedure suggested an alternative structure of dimensions and question wording was changed to make the model applicable to the new service environment. A major difference which had to be incorporated into the design was that traditional uses of SERVQUAL address *external* service providers, whereas its application to IT support means that it will be used *internally* within the organisation. This approach would undoubtedly be supported by Parasuraman et al., who state that:

> *"the use of SERVQUAL can fruitfully be supplemented with additional qualitative and quantitative research to uncover the causes underlying the key problem areas or gaps identified. SERVQUAL is a useful starting point, not the final answer, for assessing and improving service quality"* (Parasuraman et al., 1991)

A further criticism of SERVQUAL is that it does not use an elicitation of an attribute space which is (necessarily) relevant to the service recipient, rather it imposes its own attribute space through the prescribed dimensions (outlined above). Therefore, in using a standardised set of variables SERVQUAL has the tendency to impose the agenda of the analyst, rather than responding to the issues of the recipient. Ideally, it would be appropriate to set up, using the same approach, a model which uses the salient attributes of each set of service receivers. Indeed, this is the approach used in other types of study (*see for example* Lemon, 1991; Towriss, 1984). However, in the context of this thesis this would constitute too substantial an activity and it would seem worthwhile to, at least, explore the potential of a, so called, "standardised" model.

The dimensions and questions generated are explained in much greater detail in Chapter 7.

3.5.3 Cognitive Mapping Techniques

The purpose of this section is to explain the use of mapping techniques and their application to the interview phase of this thesis (described in section 3.4.2).

Basically, cognitive mapping is employed in this thesis as a way of graphically representing complex and qualitative information. Eden (1992) suggests that :

> *"Cognitive mapping can be seen as a picture or visual aid in comprehending the mapper's understanding of particular, and selective, elements of the thoughts (rather than thinking) of an individual, group or organisation"* (Eden, 1992)

The origins of cognitive mapping lie within the field of social psychology and more specifically with the work of Tolman (1948) and "Personal Construct Theory" developed by Kelly (1955, 1963). There is much debate over the degree to which it is possible to record an individual's cognition with such a technique and what behavioural expectations can be deduced (Eden, 1992; Madu & Jacob, 1991; Weick, 1990) . In this thesis the term *cognitive mapping* is used to imply a representation technique to describe the way a person views a particular, carefully bounded problem area of which they have relevant understanding, and to explore, by diagrammatic means, some of the reasons that lie behind their thinking.

As previously mentioned, cognitive mapping is a suitable technique for deciphering complex, qualitative data. By the same token, the need to elicit the depth of information required to generate (satisfactorily) a cognitive map has implications for the type of data collection technique. Several studies suggest that some form of in-depth interview is most applicable where the interviewee is allowed to talk freely. A full discussion of the interviewing method can be found in section 3.4.2, above and in section 8.2.1, with specific reference to the interviews conducted. Having assessed other data collection methods Eden et al. (1993) conclude that:

> *"Well run one-to-one interviews are however, likely to be the best method for eliciting cognitive maps"* (Eden et al., 1993)

The Practice of Mapping

Before any cognitive mapping process may begin two important considerations should be addressed, both of which relate to the in-depth interview stage which precedes the mapping activity. First, several authors stress how important it is for the interviewer to be thoroughly familiar with the respondents and to comprehend their organisational setting (Langfield-Smith, 1992; Brown, 1992) . In the case of the organisation studied in chapter 8 this was achieved through the interviewer's past employment experience, several meeting with senior managers and eventual interviewees prior to the interview sessions, and the results of the 'service perceptions questionnaire described in chapter 7. Second, the success with which a mapping exercise may be undertaken is, to a certain degree, dependent upon the extent to which interviews are recorded in the respondents' original words. This is dealt with in more depth later in this section.

The mapping process begins with the separation of statements into distinct phrases. Connections are made between phrases to show the interviewee's *flow of thinking*. The phrases and their connections are then mapped out. Central themes are used to form the backbone or structure of the map. Phrases that relate to a particular theme are added to the map so that 'clusters' of the respondent's thoughts emerge. Sometimes the connections between phrases takes the form of a causal connection. Phrases that represent ideas of cause and effect can be beneficial in understanding a respondents real perceptions (Langfield-Smith, 1992; Eden et al, 1993).

The constructed cognitive map uses the interviewee's own language. This has two benefits. By keeping the original words and phrases used, without abbreviation, the 'problem owner' is allowed to retain ownership (Ackerman et al., 1990). In addition, their understanding of the map, and any subsequent model produced, is enhanced as they can relate more easily to its substance. This is also supported by Brown (1992) who advises that the:

> *"recording* [of the interview] *needs to be as close to verbatim as possible. This means using exact words and phrases, whether or not these are technically or grammatically correct and, even more importantly recording links just as the respondent wished them, logical gaps and all"* (Brown, 1992)

Comparing Cognitive Maps

In order to understand more fully how users thinking varies it is necessary to be able to compare individual maps. Langfield-Smith (1992) suggests that it is necessary to elicit an aggregate map if we are to understand the shared beliefs which make up a group's cultural identity.

> *"If we need to establish the cognitive map of an organisation then we must aggregate the maps of individuals or groups and so go through a process of comparing individual maps before we can be assured that the aggregated map is stable"* (Eden et al., 1993)

The need to compare maps is paramount if we are to gain any understanding of how users' beliefs and perceptions are shared or differ, with respect to the IT support service they receive. Cognitive mapping lends itself to such a comparison as it provides a means by which disparate types of qualitative response can be represented in a 'like' manner.

3.6 Summary

This chapter has described the design of the research, from a methodological standpoint through to the formulation of the specific research activities. A research design framework has been described which contains qualitative and quantitative approaches. Furthermore, this chapter has provided an outline of the key techniques used to interpret and represent research activity data. The methods employed will be developed further in their relevant chapters.

CHAPTER FOUR

Exploring the Values, Beliefs and Perceptions of IT Managers

4.1 Introduction

In chapter two three propositions were outlined. These were intended to provide a suitable framework or means of enquiry for the exploration of the user - IT professional relationship.

The purpose of this chapter is to gain a greater understanding of the current way in which IT managers perform their job roles and duties, and to clarify how this influences their relationship with both user and organisation. Accordingly, this study was implemented to gain insight into the perceptions, attitudes and values which IT managers hold with regard to their jobs, as this is believed to influence their relationship with users during the process of IT adoption and assimilation.

At this point it is useful to show how each proposition is of direct relevance to a study of IT managers.

Initially, the importance of proposition 2 is apparent. This suggests that IT managers adopt a predominantly technical and economic perspective at the expense of other influences. This effects the way in which they carry out their roles within the organisation and predetermines the management of information technology. This stimulates the conditions described in the previous chapter for the remaining two propositions. Consequently, there tends to be a lack of IT and business integration, which is manifest in the 'failure' of IT to satisfy business need and the general decline in management's ability to oversee the operations of its technical units (proposition 1). Whilst such conditions prevail there is a likelihood of a conflict of interests between IT professionals and their organisational management, as outlined in proposition 3.

The survey sets out to address some of the issues raised by the propositions by means of a questionnaire, which is designed to elicit evidence of the extent of a technical and economic perspective, lack of IT and business integration, evidence of professional reference points amongst IT managers, and cases of discrepancies between IT and organisational managers.

The questionnaire is targeted at a cross-section of IT managers from a variety of industrial sectors. The selection of IT managers is based on IT professionals who hold 'significant decision making positions'.

4.2 Design and Use of the Questionnaire

Introduction

This section describes the development of the questionnaire from the propositions outlined in Chapter 2. In addition, it discusses the use of a set of attributes as a practical technique for bridging the gap between proposition and final question. The implementation process and response rate are considered.

The Use of an Attribute Set in the Questionnaire Development Process

Initially, in order to explore the three propositions, a set of seven *attributes* are derived. The attributes are used as a method of framing or enquiring into the propositions, and are intended to describe key characteristics for each proposition. The necessity for such attributes is as a series of measures to assess the relative differences, in terms of both actions and perceptions, between respondents. The notion of 'measurement' refers more to a qualitative rather than quantitative evaluation.

Appendix B details the seven attributes and shows their connection to the final structure of the questionnaire.

The importance of the set of attributes to this study is twofold. Essentially, they provide a suitable stimulus and direction for the generation of the questions. As a consequence of this, they allow for further development and clarification of the propositional ideas, outlined in chapter 2.

The Relationship Between the Propositions and the Questionnaire

As described in the previous paragraph, the use of the attributes as an intermediate step aids the development of the questionnaire. Therefore, it is important to show how the questions help in the exploration of the propositions. The table below details the connection between the 13 questions from the final questionnaire (see appendix C) and the propositions. For each proposition the degree and/or nature of the contribution is represented in terms of the three column headings :

1. **Question directly addresses proposition**: where a particular question is directly concerned with the essence of a proposition. For example, question 9 asks "How does your department integrate IT policy with overall business strategy"; a question of direct relevance to proposition 1.

2. **Question contributes to proposition**: Where a question, whilst not directly enquiring about a proposition, provides a clear insight into it. Question 5 asks respondents to describe how they assess the success of IT implementations. The emphasis they place on technical and economic criteria over and above other measures is of considerable value to the second proposition. A further reason for a question falling in this column is where it is designed to appraise the overlap between two propositions (e.g. 11 parts b & c).

3. **Question provides supplemental evidence for the proposition** : This is applicable where the question does not set out to explore a particular proposition, but rather certain IT managers' responses shed light on that proposition. This may vary from an expansion of current perceptions to a reinforcement of exiting understanding.

Please note that Question 1 and initial information concerning industry sector and details of the respondent are used as control variables. This allows for the analysis of the questionnaire taking into account potentially key differences in respondent and department activity outside the remit of the three propositions. It is also important to note that at no point during the completion of the questionnaire are respondents made aware of its true aims.

Table 4.1 summarises the relationship between each question and its corresponding proposition.

<u>Proposition</u>	Question directly addresses proposition	Question contributes to proposition	Question provides supplemental evidence
1) Lack of IT & Business Integration	9 11a	2 5 7 11b&c	3 8 10 13
2) Dominance of a Technical & Economic Perspective	6 10 Education Empl. Hist.	3 5 7	4 8 11a
3) Culture Clash Between IT Professionals & Management	4 12 13	2 7 11b&c	3 8 9 10

<u>Table 4.1 - The Relationship Between Propositions and Questions</u>

The Implementation Process

The first stage of the implementation process involved a procedure for the piloting of the questionnaire. This involved both internally (within the department) then externally exposing the questions to constructive criticism. The aim of this is to check that the questions make sense and can be understood by a range of potential respondents with no ambiguous statements; and that the responses given are of a suitable format to satisfy the aim of the question and allow for analysis. The external piloting was carried out by a variety of IT related people, including IT department heads, computing consultants and IT trainers and lecturers. Testing the questionnaire was not done as a one off exercise, but was conducted in an iterative fashion by reintroducing any changes to the piloting group, either individually or as a small group to stimulate practical discussion.

Sample selection was done by use of an up to date mailing list developed by a leading management consultancy. This focused on IT managers from a wide variety of organisations in the UK, with formalised IT functions.

Response Rate

Initially, 270 blank questionnaires were sent out to the sample of IT managers described above. This resulted in 27 completed and usable questionnaires. After three weeks follow up letters were sent to the people who had not yet responded, either by completing the questionnaire or by requesting no further part in the survey. This phase resulted in a further 17 valid responses, however there was a noticeable bias in favour of two of the industry sectors targeted. This was corrected by targeting specific sectors which were under-represented to allow for a complete picture.

The final survey consisted of 51 responses, representing a response rate of 18.9%. Responses were taken from four industry sector groupings, which are detailed in appendix D.

4.3 Process and Method of Analysis

Introduction

The purpose of this section is to describe the processes by which each completed questionnaire was analysed and subsequently coded. The analysis of each questionnaire made use of the technique of content analysis.

Content analysis is a research methodology that utilises a set of procedures to make valid inferences from written and/or verbal communications. The technique of content analysis is described in full in section 3.5.1. Its use is beneficial to this study because it will help to reflect a set of values or cultural patterns of a particular population. Furthermore, its application in a number of areas has demonstrated its ability to elicit the attributes and interests of specific groups. The sample of IT managers is suited to this technique of analysis.

Method of Use.

The descriptive attributes of respondents were coded as described in Appendix D.

Where questions required the respondent to provide a qualitative answer the following procedure was adopted. The first stage was to look for similar statements. This involved taking all the responses to a particular question and grouping them so that each group of responses represented a different theme. Each group was described in turn and related back to the entire population. It was then possible to code these responses for individual questionnaires; "1" if a statement identified a particular theme and "0" if that theme was not mentioned.

The result of this procedure was a set of qualitative descriptions of the important themes as perceived by the IT managers, together with a set of quantifiable codes which related the themes back to specific individuals. This made it possible to draw inferences by cross-referencing the codes for specific questions either with descriptive attributes (sector, education etc.) or with each other.

A detailed description of how each question was coded can be found in appendix D.

4.4 Analysis of Results and Findings

4.4.1 Introduction

The purpose of this section is to present the results and initial findings of the IT managers' survey. The aim of this section is to further the exploration of the user - IT professional relationship, through the analysis of the values and perceptions which IT managers bring to the process of IT adoption and assimilation.

4.4.2 Background to the IT Managers and their Departments

In the main, respondents spend all their working life in IT related departments (see table 4.2). Few have formal experience outside this environment, and several were involved with IT in its early years.

The IT Manager has...	Number of Respondents	% of Total Number
Always worked in IT related Departments	29	62%
Predominantly worked in IT related departments	12	25%
Spent more than 50% of career outside the domain of IT	6	13%
No information provided	4	

Table 4.2 - Respondents' Employment History

Analysis of the educational background of the respondents reveals a scientific orientation (29 cases), rather than an arts (9 cases) or management bias. In addition, less than a third of respondents (30%) had a specific IT qualification. The growth in the study of computing, particularly in the last decade, does not explain the relatively low numbers with a formal IT education. There is no discernible increase in IT education amongst the younger IT managers surveyed. Only 11 IT managers had received a formal management education. The general characteristic of the IT managers surveyed suggests that they are from a scientific background, but do not have any formal IT or management education to draw on in their jobs.

Table 4.3, below, shows the breakdown of activities for each IT department. Departments fall into three categories. The first category groups together the IT managers who said that, on average, their staff spend more than 60% of their time developing new systems. A similar group was constructed for support and maintenance activities, whilst the remainder of IT departments, formed a mixed activity group. These categories are used for further analysis to see if differences in the nature of the work undertaken influence IT manager attitudes and perceptions.

Predominant IT Department Activities	Number of Respondents	% of Total Number
Developing New Systems (61%+)	10	20%
Mixed activities	19	37%
Support/Maintenance Role (61%+)	22	43%
No information provided	0	

Table 4.3 - Predominant IT Department Activities

4.4.3 The Dominant Concerns of IT Managers

Table 4.4 suggests that IT managers believe that there is a lack of technical knowledge on the part of users and that such knowledge is required to exploit information technologies. There is a tendency for IT managers to believe it is necessary for users to have technical computing knowledge, beyond the scope of their jobs. This may serve as a barrier to addressing user needs, because IT professionals appear more receptive to users with greater technical awareness. Users who fail to acquire a certain level of technical knowledge may be at a disadvantage because they cannot 'relate' to IT staff in terms they understand.

	Strongly agree				Strongly disagree
Response	*1*	*2*	*3*	*4*	*5*
Frequency	1	1	18	21	10
Percentage	2%	2%	35%	41%	20%

Table 4.4 -
IT Managers Responses to the statement :
"In Your Organisation the Majority of Users Have Enough Understanding of Technical Issues to Fully Exploit IT"

Several interesting themes emerge from the responses to question seven. Together, these themes highlight the concerns of IT managers and expose central aspects of the perspectives they share and apply to their work roles.

Technology Related Concerns

The most commonly cited theme was a concern over the technical problems caused by frequently changing technology. This subdivided into a set of technology related issues. Firstly, the 'technology trap' issue describes a concern with the rapidity with which new information technologies are released and/or marketed by suppliers and the computing industry at large. Added emphasis is placed on the fact that such developments undermine existing technologies and frequently make them obsolete. This is illustrated by a variety of statements:

"It's technology for technologies sake" [m35]

"Technological advances make existing investments obsolete" [m13]

"We're stuck with the 'flavour of the month' syndrome, an emphasis on fashions, for example object oriented programming" [m19]

"We need to emphasise the benefits of the IT we've got rather than jumping on the technological bandwagon" [m38]

" Planned obsolescence by suppliers" [m21, m36]

Two further related issues are 'standards' and 'integration'. 'Integration' refers to the lack of compatibility between different information technologies, whilst 'standards' refers to the lack of agreed industry guidelines for governing such issues as integration. Statements which are typical of these issues are:

" There are integration problems as systems become accessible to more users" [m30]

" A general lack of standards, especially with the reduced domination of IBM" [m14]

Encompassing aspects of the three previous issues is the issue of 'keeping up with new developments'. At the heart of the IT managers' perspective is the expressed need to keep up with new technology related developments:

" The major problem is keeping abreast of developments in IT" [m28]

In many cases this need is taken a stage further and can be seen as a fear of being left behind, out of date or out of touch. This is reinforced by responses to question 8, part c, where IT managers rate 'keeping up with the latest technical developments' as very important.

<u>Change Related Concerns</u>

The second most popular theme related to the processes and problems of change brought about as a consequence of changing information technologies. This incorporates the inability to economically justify change and the failure to control the rate of change.

" We're not spending enough time on new technology. We are 'missing a trick' as a result and we'll have to rush in an attempt to catch up " [m11]

"Ensuring we are utilising IT ahead of, or at least alongside our competitors" [m12]

A more worrying theme was the number of statements which show a disregard for the working environment of users and how changes in IT effect them. Two good examples of this are:

" Users capability to absorb change" [m35]

" Users are too ready to hang on to obsolete equipment" [m19]

This demonstrates a fundamental lack of understanding of the needs of users and the organisational and IT related elements which contribute to the assimilation of IT into their work roles.

Justification for IT Investments

Of particular concern to a number of IT managers was the question of how to justify IT expenditure in financial terms. To a certain degree such statements can be viewed as either subsets of technology related concerns or of change related concerns. This is because, in the majority of cases, investment concerns were naturally related to keeping up with technical changes. Each change, whether radical or incremental, requires fresh resources to be deployed which depletes an organisation's finances. Such levels of expenditure are expected to be justified and organisations will look to the IT manager for explanation. The financial cost of the 'technology trap' issue is expressed by statements like:

"Advancements in PC hardware and software are expensive to keep up with" [m23]

Financial justification is also hampered by the rate of change:

"Repeated changes mean uncertainty for investment decisions" [m13]

Training and Knowledge Related Concerns

Several IT managers made specific reference to a gap in training and knowledge. It is recognised that new skills are required in order to utilise new information technologies. Moreover, as IT develops at an ever increasing pace IT managers feel obliged to keep up with the changes, described above, consequently their *skills are unable to keep pace* [m39]. As a result, they perceive a gap developing between the knowledge needed to use a particular technology and the knowledge that organisational staff actually have. However, the focus for their concern is not the users, who will ultimately be expected to apply the technology, but rather the *technical know-how of the IT department* [m31]. This is clear from statements like:

> *"Adequate training and knowledge of IT professionals"* [m04].

Only two IT managers related the knowledge issue to the skills requirements of users [m29, m43]:

> *"Too many small changes create learning problems for the users"* [m43].

Only one of the IT managers questioned identified that changes in IT created problems for the way training is undertaken:

> *"Suppliers don't have the training in place until after they have brought in changes. Training should be <u>part</u> of the change, not happen <u>after</u> it"* [m43].

Planning and Business Related Concerns

Planning concerns relate to an expressed need, on the part of IT managers, to address changes in technology from within a planned framework, rather than as a short term response to the issues sighted above. Only six respondents cited any form of planning as an important factor.

> *" Ensuring long-term solutions rather than short term expedients"* [m01]

> *"consistent medium term planning is required"* [m08]

Business concerns are where IT managers identify the need for IT strategy to relate to or incorporate some element, at least, of their organisation's overall objectives. This concern can be divided into those that place the emphasis on IT staff understanding business objectives and those that believe it is the responsibility of organisational managers to understand the technology. This dichotomy is characterised by the following statements:

> *"IT strategy and organisation to support business strategy"* [m20].

> *"Need for business to understand the potential of IT to get a competitive advantage"* [m09].

	Key Concerns of IT Managers	Number of Respondents	% of Total N° of Respondents
1	**Technology Related**	44	86%
2	**Change Related**	16	32%
3	**IT Investment/Justification**	15	30%
4	**Training/Knowledge Gap**	13	26%
5	**Planning & Business Related**	12	24%

Number of missing cases = 0

Table 4.5 -

Aggregate Respondent Concerns

Table 4.5 summarises the number of respondents who made statements which referred to the categories described above. Please note that it is possible for a respondent to refer to more than one category.

Question 8 was designed to build quantifiably on the qualitative approach of question 7. Respondents were asked to rate a list of five statements from 1 to 5, "very important" to "not very important", respectively. The average rating for each statement can be seen in table 4.6. Statements have been placed in their relative order of importance. An additional measure has been included which takes into account the importance of each statement *relative* to the other statements. This is done by awarding values to each statement, "1" if the statement is most important through to "5" if the statement is least important. This process is repeated for each respondent and then totals are calculated for each statement. The results of this can be seen in the "Relative Ranking" column in table 4.6. A more detailed breakdown for each statement can be found in Appendix E.

Question 8 - Factors For Consideration	Mean	Median	Mode	Relative Ranking[1]
b) Meeting end user requirements	1.68	1	1	80
a) Keeping hardware and software spending within the budget	2.26	2	1	116
d) Applying systems for competitive advantage	2.29	2	2	120
e) Maintaining adequate staff levels to meet future demands.	3.02	3	3	164
c) Keeping up with the latest technical developments	3.37	3	3	191

Table 4.6 -
Respondents' Average Rating for Statements in Question 8

Both table 4.6 and appendix E suggest that the IT managers sampled consider "meeting end user requirements" as the most important factor. This is closely followed by "keeping hardware and software spending within the budget" and "applying systems for competitive advantage". This suggests that IT managers have a far higher concern for users and a greater organisational understanding, with respect to IT, than is expressed in question 7. The incongruence between the answers to both questions suggests that there are several possible interpretations of question 8. It is feasible that, when answering question 8, respondents are not relating their answers to the previous question, as asked. Alternatively, the definition of what they understand by each of the statements differs substantially from the definitions originally intended. Following on from this it is conceivable that the statements in question 8 were poorly written which resulted in the apparent mismatch. However, the statements elicited satisfactory responses during the piloting procedure. Finally, it is possible that, when prompted,

[1] This column represents the total scores for each statement in turn. The lower the total, the greater the relative importance.

the IT managers attach considerable importance to user and strategic issues in conjunction with technical issues. This may be a genuine recognition of these issues or it may represent what IT managers believe they are expected to say. In either case, the absence of user and business related issues in question 7 does not correspond with responses to question 8.

The essence of all these issues is that the focus of IT managers' concerns lie outside their own organisations, and rest with the computing industry, as either manufacturers or suppliers. At no point is technological change focused on the users in terms of their requirements and only in a limited number of cases is it framed to incorporate some element of a business or strategic emphasis. This situation reflects the technical perspective, described in section 2.3, and the 'cosmopolitan versus local' debate, outlined in section 2.4.

Question three was designed to identify the personal perspectives which IT managers bring to their work roles. With this in mind, statements were analysed so as to identify the common themes expressed and the diversity of themes which individual respondents might reference.

When asked to detail the aspects of their work which they find most satisfying, the sample of IT managers referred to three central themes. There is a strong tendency for these themes to be mutually exclusive, i.e., respondents only made statements that fall within the boundaries of only one theme. Only four respondents refer to more than one theme.

By far the most dominant theme (29 respondents) refers to <u>technical development and implementation</u>. This is simply where respondents stated that they found the *development and implementation of new systems* [m32] most professionally satisfying. Other statements included :

> *"Adoption of standard packages after investigation"* [m22]

> *"New systems development and trials of innovative ideas"* [m12]

What makes this theme unique is the emphasis on the technical processes of the work, in isolation from any organisational or user influences. Five IT managers elaborated on this theme by including a time element, whilst a further four managers mentioned the role of technical staff:

"project completion on time" [m34]

"resolution of technical issues through my staff" [m29]

Customer service/user satisfaction groups together the 11 IT managers who perceive that *providing a quality service to users* [m38] and maintaining user satisfaction give them greatest professional satisfaction. This is (over) emphasised by the statement :

"seeing the smile on the face of a satisfied user" [m49]

Strategic and organisational themes are exhibited by 13 IT managers. This encompasses all aspects of the interaction between IT and the business ranging from a simple recognition of the role of IT, *adding value to the business* [m50], right through to *working with senior managers and directors on information management and business issues* [m06]. In several cases this theme includes an understanding of the relationship between IT and organisational change. The need to respond to the *constantly changing challenges presented by a dynamic business* [m14] is evident.

The common focus of the last two themes addresses organisational and user influences in conjunction with technical concerns. The differences arise from statements having either an operational (user oriented) or strategic (business oriented) focus. Taking into consideration the slight overlap (where respondents refer to more than one group), it becomes clear that only 21 IT managers consider either a strategic or operational element as professionally satisfying. By contrast, 29 IT managers are seen to limit professional satisfaction to technology related matters.

The statements which reflect the work aspects which IT managers find frustrating tend to form four distinct clusters. These are:

Resource related frustrations

One in three respondents made statements which expressed some form of frustration with a resource related issue. What categorises such statements is a focus on IT department attempts to control IT resources. This can reflect concern over the administrative control of the tangible elements of the technology and/or frustration with a perceived *lack of funding* [m11]. This is sometimes articulated as a *lack of* *funding to complete the job* [m45]. In several cases there is a clear connection with the technology related concerns expressed in question seven:

> *"Perpetual 'repositioning' of products by the main hardware suppliers, e.g. in the field of desktop computing where the product range is constantly changing to embrace new facilities, invalidating previous plans that I might have for implementation"* [m24]

This statement exemplifies the frustration IT managers feel when they perceive that they do not have the resources to keep up with rapidly changing technical developments.

<u>Skills related frustrations</u>

This represents cases where the respondent expresses concern about the lack of knowledge and skills within their organisation. In all cases the focus is on technical skills, however the statements can be subdivided into three distinct categories. Firstly, there is a frustration with the lack of skills that IT personnel are required to have:

> *"Shortage of right skills at the right time, especially to handle complex technical issues"* [m01]

The counter-balance to the 'failings' of IT personnel is the notion that the knowledge shortfall rests with the user populace:

> *"User inability to understand some technical aspects"* [m11]

> *"Lack of user training in departments which leads to a misuse of systems"* [m23]

To a certain degree this mirrors the training and knowledge related concerns described previously, which IT managers articulated with reference to both IT staff and/or users. In addition, question three detects an eagerness on the part of certain respondents to highlight an incongruence between the skills of IT staff and those of users and organisational managers:

"Role of department versus other departments with respect to expertise, for example, engineering departments want engineers to be full time network specialists which seems to me to be a waste of their expertise" [m20]

"Low level of computer literacy among senior managers" [m36]

"Management 'instruction' from a base of relative ignorance" [m22]

<u>User related frustrations</u>

User related frustrations refers to a cluster of statements which suggest that particular IT managers are hostile to the users, either through what they see as excessive demands placed on the IT department or by expressing that users have a lack of understanding of IT and an unwillingness to learn. The following quotes speak for themselves:

"Incompetent end users, asking for the nth time what options to take without referring to instructions" [m03]

"Dealing with the amateur user who has a PC at home and therefore thinks they know all there is about computing" [m04]

"Lack of user interest in what IT can do for them" and *"a constant bitching about IT costs by users"* [m02]

"I dislike awkward users, though I enjoy the challenge of getting the job done despite them" [m33]

The antagonistic tone of such comments appears to perceive users in a derisory way. The impression given by such statements is that many IT managers do not see themselves or their departments as providing a service. Users are not customers to them, but rather a hindrance, an element which slows down technological development. This places considerable distance between the aims of the IT department and the needs of the other organisational functions.

Another focus of IT managers' frustrations was the *lack of definition by users* [m11]. This reflects the inability of users to define what they want from information technology in language the IT staff can relate to.

"Getting the user to define precisely what he wants" [m47]

Bureaucracy related frustrations

In a large number of cases (21 respondents) statements address the topic of organisational bureaucracy. Such statements generally describe some animosity towards the rest of the organisation. This may take the form of criticism of organisational *"bureaucracy and negative attitudes"* [m17] and *"Internal politics"* [m18]. Also, some respondents appear to resent organisational influences and controls:

"Unnecessary 'red tape' and politics" [m10]

"Convoluted procedures arising from the bureaucracy required by the organisation at its current point of evolution" [m05]

In the extreme they show attempts by IT departments to act or think independently of the rest of the organisation; a power struggle. *"Organisational complexity and petty empires"* [m37] provide the backdrop for a lack of communication and conflict between some IT managers and their organisational colleagues:

"Constraints on my real authority to manage [due to] *imposed/artificial deadlines without any real consultation on the IT front - adds to pressures and can affect quality of the delivered product"* [m44]

	Key Frustrations of IT Managers	Number of Respondents	% of Total N° of Respondents
1	**User Related**	21	42%
2	**Bureaucracy Related**	21	42%
3	**Resource Related**	17	34%
4	**Skills Related**	8	16%

Number of missing cases = 1

Table 4.7 -

Aggregate IT Manager Frustrations

4.4.4 IT and Strategy Combination

Table 4.8, taken from responses to question 2, would seem to suggest that many IT managers (51%) view their departments as 'driven by the day to servicing of end users'. This implies that they have recognised the need to provide a supporting role for users as they assimilate IT. A further 20% of IT managers see the organisational control of the IT department as 'governed by senior management' outside their departments. However, 28% of those surveyed regarded the IT department as an 'autonomous unit', self-governed rather than user or organisationally driven.

Response	Value	Frequency	Percent
Senior Management	a	10	19.6
Autonomous Unit	b	14	27.5
Servicing End Users	c	26	51.0
No response given		1	2.0
TOTAL		51	100.0

Table 4.8 - Perception of Organisational Control

In addition, responses to question 5 suggested that IT functions are beginning to recognise the importance of both user and business inputs in order for IT to be a success (discussed in detail later in this section).

Of primary interest is the degree to which IT managers make reference to any form of strategic planning of IT. A crude division into those that employ a strategic approach and those that do not reveals that only half the IT departments questioned gave evidence of a strategic connection with the rest of their organisation (table 4.9). However, the reasons for the lack of a strategic approach are not clear. It is feasible that particular organisations do not seek to formulate any form of overall strategy, or find that it is inapropriate to think beyond the short-term given, for example, their business environment.

Response	Frequency	Percent
No strategic planning	25	49.0 %
Strategic planning	25	49.0 %
Missing Value	1	2.0 %
TOTAL	51	100.0 %

Table 4.9 - Use of Strategic Planning

A more detailed investigation of the answers given to question 9 attempts to understand the different forms that strategic and non-strategic planning can take. These groupings are:

a) **No integration**

Where there is no integration of business and IT strategy. IT managers either state that there is *no formal integration* [m30] or they make reference to the fact that the business regulates spending or oversees budgetary controls, for example:

"Mainly controlled by cost and budgetary means" [m22]

It is important to note that business controls on spending does not mean that IT strategy incorporates business needs.

b) **liaison only** *(Liaison)*

Attempt to co-ordinate IT and business strategy by committee. This commonly takes the form of a quarterly liaison between the IT function and some representation of business managers. This represents an attempt to co-ordinate activities rather than have organisational concerns inform IT strategy. Statements elicited include:

"Attending local liaison meetings" [m08]

"Via a steering committee consisting of senior users and IT management" [m25]

c) **User led** *(Reactive)*

Where the IT function reacts to short term user driven problems. This scenario represents a greater user awareness, however, there is often no strategic linkage of IT with business objectives, for example:

"Driven by user requests with me advising of what is possible" [m28]

d) **IT strategy is related to business strategy**. *(Related)*

With this group some attempt to combine IT strategy with business strategy takes place. However, IT strategy is still not driven by organisational needs. Respondents generally identified some formal linkage with business strategy, which is seen to 'inform' IT policy, for example:

"IT policy is integrated through the Associations operational plan issued yearly and updated throughout the year" [m43]

e) **IT strategy is a result of business strategy.** *(Result of)*

This is where business strategy is dominant, the aims of the business are decided and IT strategy is developed to best enable the business strategy. IT strategy is considered from an organisational perspective. The following statements are good examples of where IT strategy is interwoven with long-term business objectives from an organisational perspective:

"An Information Strategic Plan is derived from the ten year business plan with the involvement of directors. It is reviewed annually in conjunction with the strategic business plan" [m06]

"Three year planning at executive level feeds into the functional plans (including IT). All IT initiates are justified by user directors" [m14]

" The organisation has a business plan. The Information Dept. has an information strategy to fulfil the business plan. The information strategy determines IT policy/strategy" [m38]

An interesting alternative to the more formal business driven approach described above, is where IT policy is seen as the result or product of the organisational environment or 'culture', for example:

"IT policies come from the company core values of: timeliness, communications, customer service, quality, people development and accountability" [m12]

Table 4.10, below, shows the number of IT managers who made strategy statements which referred to the categories described above. This is useful as it shows the relatively even spread of strategy options currently being employed within organisations.

Strategic Response Type	Number of IT Managers	Percent
No integration	3	5.9
liaison only	11	21.6
User led	9	17.6
IT strat. related to business strat.	14	27.5
IT strat. result of business strat.	12	23.5
Missing Value	1	2.0
TOTAL	51	100.0

Table 4.10 - Business and IT Strategic Relationships

An initial investigation into how this situation varies across different industry sectors would suggest that service and utility organisations a more likely to make the necessary strategic connection, than are other sectors. At first glance public sector concerns appear to address certain issues of strategy. However, this is merely a response to a cross-section of external legislative changes outside the bounds of their own organisational needs. Such changes dictate the direction of IT, removing effective control from both IT departments and organisational managers alike. This situation is particularly intense among poll tax authorities and health authorities, who are undergoing considerable change orchestrated by central government.

It is interesting to note that IT managers with formal IT education are more likely to follow a strategic path, however this would require a larger sample to show any statistical significance.

4.4.5 Understanding the Systems Development and Support Procedure

First of all, this section addresses the procedure for setting priorities for new systems implementation and development. The focus of this is on the mechanisms used for deciding the importance of a system and the people involved in the decision making. This is followed by an attempt to understand the different ways in which IT managers determine levels of support service within their organisations. Of particular interest are the criteria IT managers use in their attempts to satisfy user support requirements. This section draws on responses to questions 10 to 13.

Approaches to Setting Implementation Priorities

Responses to question 11 investigate the procedures used to determine the importance of new IT developments to an organisation. Consequently, this reflects the basis which IT managers use to decide which new applications to adopt. What is apparent from the responses given is that IT managers either refer to specific criteria or they refer to specific organisational people when assessing priorities. Only five respondents describe a procedure which contains elements of both 'criteria' and 'people'.

The use of specific criteria is evident in the responses of 30 IT managers. The most common of these (15 respondents) relies on some form of economic factor which must be satisfied to warrant adoption or development. This may take the form of a return on investment, cost-benefit analysis, profitability or financial payback. Of the remaining criteria, legal requirements play an important role in the IT decisions of public sector organisations. Under this scenario, new systems are largely pre-determined by legislative demands. Greater organisational and user freedom can be seen in the last two criteria. Priorities are set either by reference to organisational strategy and business objectives or alternatively through a re-iterative process of proposal, assessment and prioritisation.

Rather than referring to specific criteria 26 IT managers cite some arrangement of organisational personnel to describe the prioritisation process. Three patterns emerge from the analysis. The most popular of these is the use of a top level decision making group. Such a group is frequently described as a steering committee by respondents and comprises senior managers from across the organisation. A less common alternative to this is where both users and IT staff specify priorities usually through a framework of regular meetings. Lastly, several IT managers saw the prioritisation of system selection and adoption as the province of the IT department alone. The following table (4.11) summarises the number of respondents who fall into each category.

Criteria Related	N° of IT Managers
Economic	15
Legal Requirement	8
Orgnl. Strategy	7
Proposal & Assessment	5

People Related	N° of IT Managers
Top Level Decision Group	16
Users & IT Staff Review	5
IT Dept Only	5

Table 4.11 - Aggregate Responses to the Process of Prioritisation

Criteria for implementation success

Responses to question 5 required IT managers to list the main criteria they use in assessing the success of IT implementations within their organisations. From the responses given it is possible to gauge how IT managers perceive IT success or believe it should be assessed. It is also possible to identify the different combinations of criteria used.

Initial analysis revealed six basic groups of criteria. Each group is referenced by at least more than one respondent. These groups, when considered at a higher level, fall into two distinct classifications. These are "technical and economic issues" and "business and user issues". The number of respondents forming each group is summarised in Table 4.12, below.

Technical and economic issues contains three groups; cost related criteria, time criteria, maintenance and reliability criteria.

Cost criteria refers to statements that embody notions of economic cost and justification, *cost effective implementation* [m01], *Return on Investment* [m03], *meeting budgets and targets* [m13]. Frequently associated with this is the idea that IT implementations are successful if they meet certain time criteria. For example, one respondent believed that for an implementation to be successful it should,

> *"Meet the target timescale,* [and be] *within cost limits"* [m35]

Maintenance and reliability criteria cover the various technical aspects which IT managers perceived as crucial to 'success'. Such aspects included the *reliability and recoverability of systems* [m01], *low fault rates* [m11], and the *level of ongoing maintenance requirements* [m29].

<u>Business and user issues</u> refer to the groups of responses which reflect user satisfaction, business needs, and support criteria.

The most commonly cited group was user satisfaction. Fourteen respondents stated directly that *user satisfaction* or *satisfied users* was a major criteria. Variations on this theme included *meets user aspirations* [m24], *degree of customer satisfaction* [m29], *positive user feedback* [m12] and *customer involvement to satisfaction* [m07].

Related to the operational/user focus is a small group of six respondents who stated that implementation success could be assessed through the *amount of support required after implementation* [m18]. In addition, two respondents [m11, m26] made statements which outlined that success could be related to the levels of service provision required.

A large number of IT managers focused on business needs, rather than user satisfaction. On the whole, the two were mutually exclusive (apart from 3 respondents). This suggests that certain managers use a more top-level, strategic approach, whilst others focus on a more operational, lower-level within their organisation. Business needs are where IT managers view success as *achieving business objectives* [m07] or where IT implementations show *conformity with overall business strategy* [m19]. It should be stressed that the different approaches, taken by IT managers, may depend on the *nature* of their organisation.

High Level Issues	Individual Criteria	Number of IT Managers[2]
Technical & Economic Issues	Cost criteria	27
	Time Criteria	17
	Maintenance & reliability	11
Business and User Issues	User Satisfaction	31
	Business Needs	15
	Support Criteria	6

Table 4.12 -
Summary of Criteria Used for Assessing IT Implementation Success

It is interesting to note that in 29 cases IT managers mixed technical and economic criteria with business or user criteria.

Determining Support Service Levels

From the sample of IT managers questioned in this study there would appear to be three generic approaches to determining service levels. These are described as:

(1) Financial :

Where the level of service is determined by economic means. Service is provided to match what the user (or their department) is prepared to pay for. For example:

"As much as the user's budget will allow" [m41]

In three cases it was suggested that economic guidelines, such as cost/benefit analysis, were employed to establish levels of support services.

[2] It is possible for respondents to sight more than one criteria.

<u>(2) Formal</u>

Levels of service are agreed between the IT manager and some organisational representation, often user groups or senior management. These agreements are then formally recorded as either a Service Level Agreement (SLA) or a set of Business Priorities used to direct support activities.

<u>(3) Informal</u>

This refers to situations where service levels are arrived at by some informal approach. Often, there are no hard and fast rules, rather services are provided as the result of short term need or discussion. This is best explained by example:

"Generally FIFO [first in, first out] *however the impact of the problem is assessed"* [m04]

"Partly how loud the users shout!" [m08]

The informal approach, in the main, relies on the "first come first served" principle. The only limiting factors cited were the importance of the problem with more important user needs receiving more service, and the limit on IT staff manning levels mentioned by three respondents.

Generic Type of Criteria	Number of IT Managers	% of Total Respondents
(1) Financial	11	22%
(2) Formal	15	30%
(3) Informal	23	46%
Other Responses	1	2%
missing	1	

<u>Table 4.13 -</u>
<u>Summary of Responses Regarding Service Level Criteria</u>

Table 4.13 provides an indication of the numbers of IT managers following each generic approach. One notable exception [m33] outlines how services are adjusted to allow for different levels of IT usage by individual users and some reflection of the knowledge they require to utilise new systems and technologies:

"This depends on how much IT they use and how good the system is. Old systems can require a lot of support to keep them going. Also users who are newly implementing systems such as Community Charge will require a larger service allocation" [m33]

An essential part of understanding the user support procedure is to identify how IT managers believe they interact, or should interact, with their users. Questions 12 and 13 are instrumental to this analysis. Figures 4.1 and 4.2 show the frequency of responses to the likert scales used in question 12 parts a) and b), respectively.

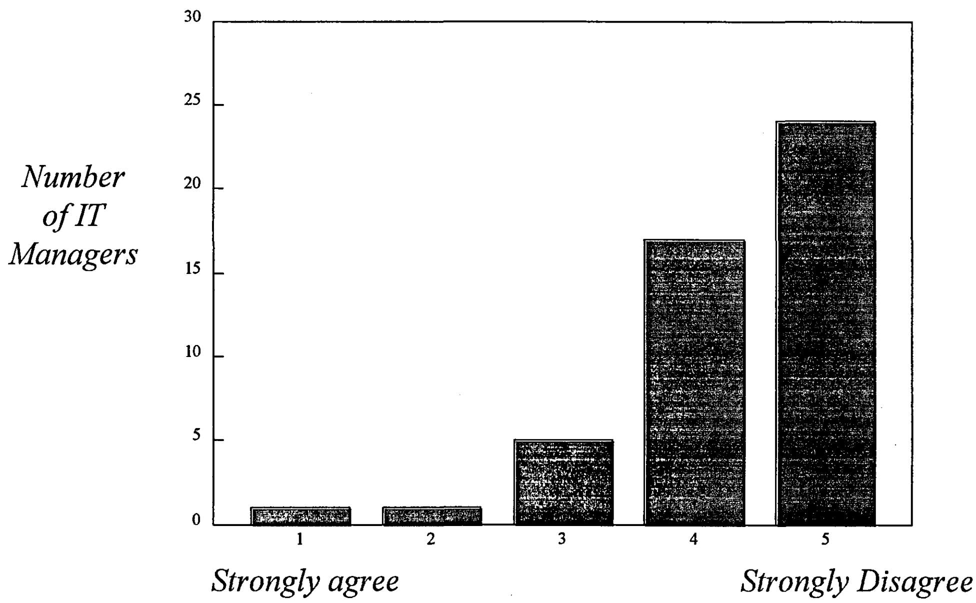

Figure 4.1 - Responses to the statement: "The IT department should, as a general principle, encourage users to select their own hardware"

The figure above shows quite clearly that the vast majority of IT managers do not consider that their departments should play any part in encouraging users to select their own hardware. This suggests that the bulk of IT managers perceive themselves as 'technology controllers' as opposed to 'service providers'. To a certain degree such a perception is to be expected. Controls on key organisational data need to be effective and a suitable technological infrastructure which allows for the smooth interchange of information between organisational departments should be in place. However, these should be based on criteria specified by organisational concerns and informed by reference to senior organisational personnel. Unfortunately, question 12 a) does not allow analysis of whether IT managers see themselves as controlling the technology by dictate or whether they see their role as providing technical expertise to aid business objectives.

In Figure 4.2 IT managers were asked to say whether their departments should encourage users to select their own software. Responses to this statement were more evenly spread than in part a), above. The bar chart (figure 4.2) shows a more even distribution. A far higher percentage of managers stated that they agreed or strongly agreed with the statement, and the general level of disagreement is diminished by comparison to figure 4.1.

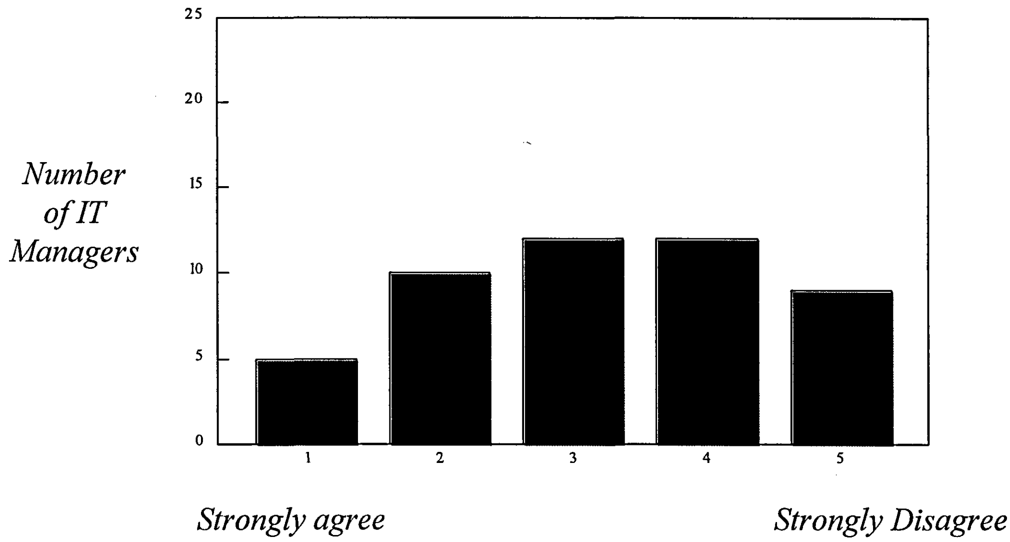

Figure 4.2 - Responses to the statement: "The IT department should, as a general principle, encourage users to select their own software"

Question 13 was designed to identify the circumstances under which users are allowed to develop their own applications. The question makes clear what is meant by 'applications' and gives examples of the range of possibilities. What is revealing about the responses to the question is the way in which specific answers are phrased and the elaboration on what IT managers see as the crucial areas for control.

At the one extreme, a number of respondents described a situation in which users have no freedom to innovate with their IT working environments and no scope to develop applications to aid their work roles. For example, user are given the scope,

> *"In analysing the data which exists, but not batch processing or maintaining new data"* [m14]

" [users] *should be limited to tailoring of reports through the use of end user programs. Even this happens seldom"* [m02]

In certain cases the nature of a specific business sector imposes its own restrictions. The following is an example taken from the banking sector:

"Because of the nature of our business and the security implications involved we do not allow users to develop their own software" [m47]

The general scenario, discussed by the majority of respondents, is where users are allowed certain freedoms with PC based technologies, but are not given any scope within mainframe environments. However, the guiding criteria IT managers use to regulate user developments varies tremendously. The following examples have been selected to illustrate this. A common limitation is to only allow users to develop applications that are not of any organisational significance, and to monitor their every move:

"Users develop PC applications under guidance from IT [department], *if competent and only of low corporate impact"* [m40]

In several cases only users who are deemed to have the necessary IT knowledge are allowed to develop their own applications:

"The only circumstances are those when the user has sufficient expertise e.g. simple databases, using DBase IV, spreadsheets etc. Otherwise, they would not have the ability required and in learning may cause havoc if unsupervised" [m33]

This may be contrasted with a more proactive approach where the IT department attempts to circumvent some of the problems IT managers associate with user developed applications:

"End user computing is difficult to control in this type of environment (a large number of IT literate users). We're trying to educate users in the relevance of standards and the need to ensure data security and integrity" [m29]

Another point of control identified allows users to develop applications that rely on their own key departmental knowledge:

> *"Applications that are department specific, applications that require a specific skill or knowledge that exists outside the IT group. In either case the IT group would be aware of the development and provide consultancy as appropriate"* [m07]

This is complemented by a number of IT managers who either allow user considerable scope (within certain pre-defined bounds) or encourage user applications as long as they are PC based:

> *"We allow users full autonomy for spreadsheet, graphics and standard packages. Any other systems must be authorised by my* [IT] *department"* [m22]

> *"We encourage PC applications only, through packages, although there is nothing to stop the user from programming. Mainframe & AS400 strictly not allowed"* [m26]

To conclude, a dichotomy seems to exist between the IT managers who feel they have to tolerate and contain user developments, and those that encourage it and provide training to improve the results and respect organisational limits. This dichotomy can be seen as exemplifying a split in perspective between a technology controlling attitude and a service provision approach. Further investigation reveals that there is no discernible difference between the views of IT managers from the different departmental categories described in Table 4.3, except that managers responsible for developing new systems have a greater tendency to adopt a technology control perspective. By contrast it is the IT managers who provide a greater support role that form the backbone of the service provider perspective. The sample is not of sufficient size to test for any statistical significance, however a breakdown of question 12 part a) supports this finding. Figure 4.3, below, compares responses to the Likert scale for IT departments who are predominantly involved in development work with those that spend the majority of their time on support related activities. The contrast in attitudes to the users' selection of software is apparent. Whilst this question does not directly address the circumstances under which IT managers believe users should be allowed to develop their own applications, it does reinforce the differences in technological control that appear to exist.

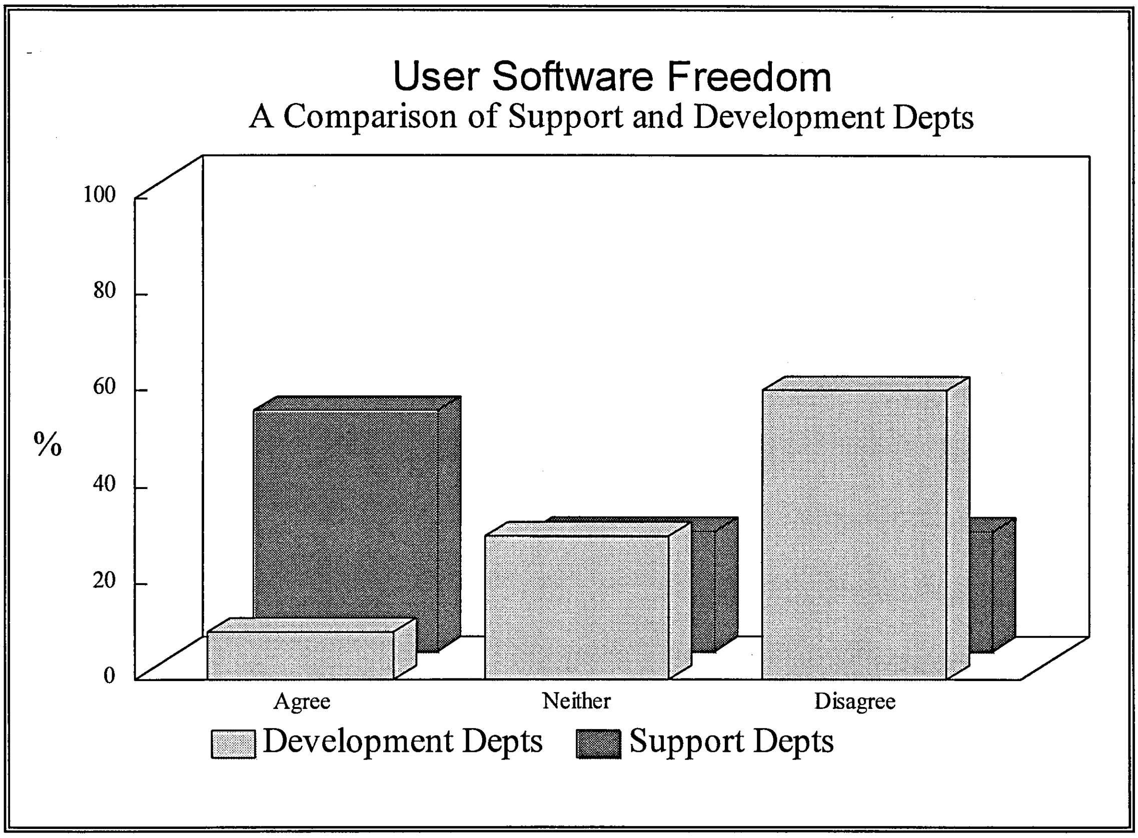

Figure 4.3

4.5 Conclusions to Chapter Four

4.5.1 Introduction

The purpose of this section is to place the findings within the propositional framework. The structure of this section is designed to pull together the relevant analysis (from section 4.4) and present it under headings which correspond with the propositions described in Chapter 2. Proposition 2 is presented first as much of the analysis which supports it provides a useful backdrop for propositions one and three.

4.5.2 The Dominance of a Technical and Economic Perspective (Proposition 2)

To recap, this proposition suggested that there is a tendency for IT professionals to view their work roles in a purely technical and economic way. This, in turn, influences the way in which they define and discharge their duties which is a significant contributory factor to the other propositions.

The dominant concerns of IT managers displayed several aspects which reinforce this proposition. By far the most fundamental concern is clearly focused on the technology itself. The pace of technical development leads to a phobia amongst IT managers that they will not be able to keep up. This emphasises that they consider the computing industry as important and the dominant driving force. IT managers are predominantly reactive to changing technology. This is clear from their change related concerns. It is also interesting to note that, on the whole, the IT managers perceive it as their duty to keep up with technical capabilities otherwise they feel they are 'failing'. By contrast to the prevailing technology motivated change there is little or no strategic or user oriented change. The changes that do occur tend to reflect a short term response rather than a long term planning process. Furthermore, very little concern is expressed as to whether these developments meet business needs or whether users really want them. The inability to plan is an intrinsic response to focusing on technology alone when that technology is in such a state of flux. This situation is compounded by the lack of other goals and/or objectives to govern or regulate the process. The inherent technological dominance is further seen in the difficulties IT managers have in justifying their IT investments. Without reference to the needs of the business it becomes hard for IT managers to demonstrate to senior and line managers any worth the expenditure may have. This point will be further explored in proposition one, below.

A similar set of considerations carry through into the personal perspectives which IT managers bring to their work roles. When addressing the aspects of their work which they find satisfying a dichotomy is found to exist. A majority of IT managers (29) place an emphasis on the technical processes of their work in isolation from any organisational or user influences. By contrast, only 21 IT managers gain work satisfaction from organisational and user influences, in conjunction with technical concerns. Whilst this does not apply to every individual, it can be seen that IT managers are, by in large, motivated by the technology alone.

Several themes emerged from question 3 (part b) which addressed the frustrating elements of the IT managers' work. The technical perspective is evident in the number of statements which reflect attempts to control tangible IT resources and an animosity towards the rest of the organisation. In a number of cases it is apparent that there is a lack of communication and a degree of conflict between IT managers and their organisational colleagues. In addition, the respondents expressed a relatively high level of antagonism towards their users. Table 4.7 provides a useful summary.

In the main, IT managers are sceptical that users have enough understanding of technical issues to exploit information technology fully (Table 4.4). However, nowhere do they express concern over the skills and knowledge the users have or consider ways to enhance user understanding. The only skills issue raised is directed at the level of technical understanding of IT staff. This suggests that issues such as user training or troubleshooting will rank fairly low on their list of priorities.

In analysing the user support process IT managers revealed a number of their perceptions of how they interact, or believe they should interact, with their users. The vast majority of IT managers do not consider that their departments should play any part in encouraging users to select, or make recommendations concerning, their own technology hardware (figure 4.1). This implies that, by in large, IT managers perceive their work roles as 'technology controllers' rather than as 'service providers'. As discussed in the analysis, to a certain degree such a perception is to be expected. To reiterate, there is often an organisational need for controls on key organisational data and an effective technological infrastructure. However, these should be based on criteria specified by organisational concerns and informed by reference to senior organisational personnel. They should represent a compromise between the needs of the organisation and individual user requirements. Unfortunately, question 12 a) does not allow analysis of whether IT managers see themselves as controlling the technology by dictate or whether they see their role as providing technical expertise to aid business objectives.

By contrast, the 'average' IT manager appeared more favourable towards encouraging users to select their own software (Figure 4.2), as opposed to hardware. Further analysis revealed that the general scenario, described by IT managers, is where users are given limited freedom with PC based technologies, but are not given any scope within mainframe environments. However, the principles which IT managers use to regulate user developments varies enormously. The relevance to this proposition rests with the fact that a dichotomy appears to exist. On the one hand there are the IT managers who feel they have to tolerate and contain user developments, and on the other there are the managers who encourage the users, whilst providing training and assistance to improve results and ensure organisational limits are respected.

On the whole, the results of the survey support and reinforce this proposition.

4.5.3 The Lack of IT and Business Integration (Proposition 1)

Proposition one suggested that, to a greater or lesser degree, there is a lack of IT and business integration, which is manifest in the "failure" of IT to satisfy business need and the general decline in management's ability to oversee the operations of its technical units. Some of the reasons for this were explored in Section 2.2.

This survey suggests that there are a number of reasons why a lack of IT and business integration exists. These reasons help to maintain a gap between business units and the IT function within organisations. The vast majority of IT managers sampled had little or no business background and few had formal experience outside the IT environment. However, this does raise the question as to what extent managers from other functional areas have experience beyond their own function. IT managers share a number of common perceptions about their users. In order to integrate IT with the business it is believed necessary for users to have a high level of technical skills and to be familiar with the technical language. Indeed, 42% of respondents cited some form of user related issue as a major frustration of their jobs. Generally, they perceive users in a derisory way and many of the comments made suggest that users are not perceived as customers, but rather as a hindrance which slows down technological development. Furthermore, several IT managers focused on the inability of users to define what they want from IT in language the IT staff can relate to. This reinforces the technological uncertainty argument, discussed in Section 2.2.2. Despite concern over the lack of users' technical knowledge, no concern is expressed by IT managers as to how to improve that knowledge, whether by training or some other means. These issues imply that there is often a considerable gulf between IT professionals and the users who make up the business functions. This must limit the application of IT to business scenarios.

Further evidence which supports the notion that a gulf exists between the IT function and the rest of the organisation is to be found in the bureaucracy related frustrations expressed by 43% of the IT managers questioned. The statements made by IT managers demonstrated that a considerable degree of animosity and resentment is felt towards the rest of their own organisation. Whilst the issue of organisational control and power is really the province of proposition three, it is important to note that such conflict can only serve to hamper integration by distancing the IT function from the rest of the business.

A key area for proposition one is the understanding of how IT managers perceive technical change. The main concerns of IT managers encompass the technology and change related issues. What is apparent from this is that IT managers perceive organisation change in terms of technological change, rather than business needs oriented change. This suggests that the majority of IT professionals take a linear, technology push approach to change. A number of respondents also seemed to believe that any technical change must be good for the business. What is evident from a number of statements is that there is a common disregard for the working environment of users and how changes in technology may effect them.

A critical issue for proposition one is the degree to which IT professionals perceive the importance of IT planning with respect to the organisation at large. Of further interest is the provision IT professionals make for the strategic integration of IT with overall business strategy. Responses to several questions would, for most cases, show that the issue of IT and business integration has begun to be recognised. However, IT departments taking action to address this situation are clearly in the minority. Only half of the IT departments questioned employ a strategic approach. Further investigation identified five different degrees of business and IT integration. These reflect varying stages of business awareness and interaction with senior managers and users. In only 12 cases did organisational concerns inform IT strategy. More common approaches addressed short-term interaction with either users (reacting to user requests) or senior managers (through a liaison procedure e.g., steering committee). In addition to the lack of strategic perspective, IT managers showed little concern for planning and business related issues. Only 12 respondents cited the need to address changes in technology from within a planned or business oriented framework. A further consequence of the lack of strategic planning is that a number of IT managers experience difficulty in justifying their IT investments. Without reference to the needs of the business it becomes hard for IT managers to demonstrate to senior and line managers any worth the expenditure may have. Long-term, strategic investments are particularly difficult to justify whilst IT managers take a short-term, economic perspective to the process of prioritising new system developments (see table 4.11).

IT professionals perceive a system to be successful in two generic ways: these are *technical and economic issues* and *business and user issues*. Both of these groups comprise several individual criteria (described in section 4.4.5). The central observation from this is that in 29 cases IT managers mixed technical and economic criteria with business or user criteria. However, whilst IT managers place value on user satisfaction and business needs once the IT systems have been implemented, there is far less evidence to show that such needs are taken into account before and during the process of development.

4.5.4 The Culture 'Clash' Between IT Professionals and Their Organisational Managers (Proposition 3)

Proposition three is concerned with the 'culture clash' of IT professionals with their organisational management, due to fundamental differences in outlook and objectives. Section 2.4 outlines the professional characteristics to be found in IT management and their influence on the IT professional - user relationship.

The majority of IT managers share a common, scientifically oriented, background. In addition, 87% of IT managers have either always or predominantly worked in IT related departments. Furthermore, IT managers may also be characterised by their lack of management training. Their central area of professional interest rests solely with technological issues. This may be seen in their emphasis on technology and technical change related concerns. The technocentric drive of IT managers has been explored in section 4.5.2, above.

This survey also suggests that IT managers share a lack of appreciation for user and business related issues. The emphasis placed on understanding a body of technical knowledge reinforces the notion of profession expertise and expertise power (discussed in sections 2.4.1 and 2.4.2, respectively). This study has demonstrated how IT professionals appear more receptive to users with greater level of technical awareness. By contrast, IT professionals appear more removed from users who lack technical experience and knowledge and cannot speak the 'secret' language of IT. In the main, IT managers rate business and users concerns very low compared to technology related concerns. Far greater emphasis is given to the development of the skills of IT staff, than to the skills of users. Only two IT managers, from the entire sample, related the knowledge issue to the skill requirements of users. This implies that their commitment is to the furtherance of their own profession, rather than the furtherance of the organisation. In addition, IT managers appear to identify more readily with the computing industry at large, than with their own business. This may be seen in their overwhelming determination to keep up with the latest technical developments, often regardless of the organisational implications (see section 4.4.3). They see it as their professional duty to respond to externally generated, technical change, than to internally generated, business change. When combined, these issues will, almost certainly, bring IT professionals into conflict with organisational managers and their departmental users who generally hold a more organisationally centred perspective.

This survey revealed that IT managers hold several values and perceptions which serve to reinforce the autonomy and control of the IT function. 42% of respondents resented attempts by the organisation to exert any influence or control over their activities, whilst 28% of respondents see their departments as autonomous units. The issue of control over IT activities is also manifest in the approaches taken to user freedom. Whilst all departments influence control over hardware resources (figure 4.1), there is a clear division on influence over the adoption of software by users. The dichotomy between support oriented departments and more traditional system development departments is shown in figure 4.3. This exemplifies a split in perspective between a technology controlling attitude and a service provision approach.

The stringent control over hardware, expressed by 89% of IT managers, is of interest because it suggests that IT professionals exercise considerable resource power. This is reinforced by a series of statements which demonstrate that IT managers feel their control of IT resources is being undermined through a lack of funding.

4.6 Summary

This chapter has examined the IT professional - user relationship by exploring the perceptions and attitudes of a sample of IT managers. The propositions (outlined in Chapter 2) are used to guide both the design and analysis of this study. The selection and justification of research method are explained in Section 3.4.1. This study represents part of the wider investigation into the delivery of IT services, and complements the research in Chapters 5 and 6. The design and use of the questionnaire are discussed in section 4.2. This explains how the final questionnaire was derived, how it relates to the propositions, and how the process of implementation was conducted. Section 4.3 describes the process and method of analysis. The analysis and findings, presented in section 4.4, discuss the background of IT managers, their dominant concerns, how they relate IT and organisational strategy, and their perceptions of the system development and support procedure. The conclusions endeavour to place the results and findings within the propositional framework.

CHAPTER FIVE

The IT Profession's Relationship with the Current Literature.

5.1 Introduction

In chapter 2 three propositions were outlined. These were intended to provide a suitable framework or means of enquiry for the exploration of the IT professional - User relationship.

This study addresses the concerns of Proposition 2, namely that there is a dominance of a technical and economic perspective in technology management, with little or no consideration of other influences. Consequently, this influences the way in which IT professionals view their roles and define, perceive and discharge their duties. Although this chapter is directly concerned with proposition 2, it is expected that the analysis and results will shed light on propositions 1 and 3, the lack of IT and business integration and the professional versus management 'culture clash'. This is discussed in the conclusions to this chapter. Figure 5.1 shows the relationship between the current literature and the values and perceptions of IT professionals.

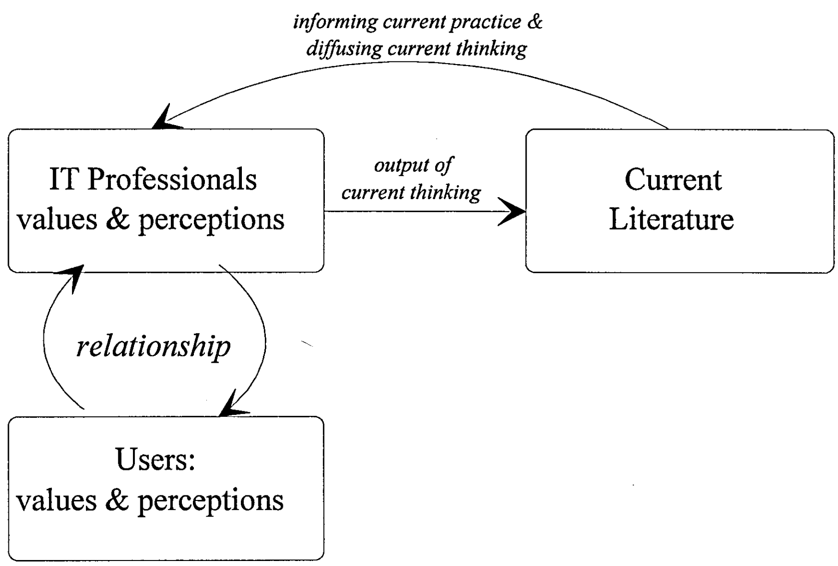

Figure 5.1 -
Relationship of the Current Literature to IT Professionals' Values and Perceptions

5.2 The Examination of a Current Innovation in Information Systems and Technologies.

The Case For EDI

Electronic Data Interchange (EDI) figures as a case study of current innovations in information systems and technologies. So, EDI can be seen as representative of the development of many forms of IT.

One reason for this is that the initial development of EDI appears to be driven by people of a technical background and that many naturally focus on technical issues. As a result, many of the organisational and business aspects remain unconsidered. At this point it is important to consider the current context of EDI, in particular the somewhat limited debate concerned with its relationship to organisational issues.

EDI in Context

The initial view of EDI was to see it merely in terms of "Paperless trading"; the benefit to companies being increased efficiency through the automation of existing manual processes. Typically, this would include such activities as data entry and the shift from paper based to electronically based communication. However, this early, rather short-term perception has been expanded to incorporate the notion of EDI's value in gaining a competitive advantage and the strategic issues this raises.

Bytheway and Dyer (1991) see implementations of EDI falling into three categories: efficiency, effectiveness and evolution. Efficiency is concerned with the shortening of the time needed to complete a work task successfully, or similarly, to allow more work to be done in the time available. Effectiveness relates to the ability to restructure work which allows employees to utilise their time more constructively, resulting in quality, excellence and image improvements. Business evolution is clarified as extending, re-defining and even making new markets. The efficiency and effectiveness categories only encompass the ideas of paperless trading, mentioned earlier, which only addresses productivity issues. Furthermore, they believe that the strategic benefit of EDI is realised through its ability to enable evolution, but that this is 'just not possible where managers are preoccupied with efficiency and effectiveness matters'. The view held here is that whilst technical issues predominate, managers will be limited to only efficient and effective applications. Additionally, a worse scenario exists whereby an organisation is forced to implement EDI as a defensive response to a rival's exploitation of EDI. In such cases, the organisation is motivated to adopt the technology in order to stay in competition within its existing marketplace. EDI, like other forms of IT, is perceived as a technological imperative, with little or no regard for business needs orientation.

The question of business evolution is also addressed by Dunleavy (1988). He sees the benefits from EDI as two phases of development. Phase one focuses on the technical benefits through paper substitution, whilst phase two incorporates a strategic orientation. 'Users of EDI will realise the greatest benefits when they elevate EDI from phase one to phase two, which integrates business and systems issues' (Dunleavy, 1988).

If EDI is viewed in the context of a current innovation in information systems, then it becomes feasible to apply some of the conclusions drawn from the work of Langrish et al. (1972). Clear identification of user-need, together with the support of a top person in authority (for example, the notion of the 'boardroom champion'), were the two most frequently occurring factors resulting in a successful innovation. In addition, in several cases where the business issues were well defined a good deal of the technical uncertainty was removed from the innovation process (Georghiou et al., 1986). Here, the implication for the development of EDI is that a well defined, organisational orientation will increase the likelihood of success.

Another business theme that has emerged is the importance of senior management to the success of EDI implementations. Given this situation, it is not surprising that, with few exceptions, it is management factors that have a tendency to differentiate between success and failure in exploiting EDI. Recent research into identifying the factors that lead to information systems project abandonment concluded that although the abandonment problem depends to a great extent on the particular organisational and information systems environments, management and organisational politics were the major factors faced by a majority of companies. These factors far outweighed the technological and economic causes of failure (Ewusi-Mensah & Przasnyski, 1991).

Another concern is that much of the EDI literature addresses the wrong level of management and issues of business advantage are dictated by the technology, rather than distinguishing how EDI fits an organisation's business plan. Papers are frequently targeted at the information systems professionals within companies who share a common technological perspective. Furthermore, on the few occasions that business issues are addressed they fail to properly consider technical issues.

5.3 Research Method

The factors discussed above provide a strong case for assessing the trends within EDI and the perspectives and attitudes held within the EDI industry as a whole. However, it has proved difficult to capture an impression of the full picture. As a consequence of this, it was decided to focus attention on the EDI literature, as this would reflect contemporary thinking and would be representative of current perceptions within the industry. The following research method was devised as a suitable way of eliciting the key features of the literature on EDI, with regard to the proposition that there is a dominance of a technical and economic perspective.

The sample comprised 293 journal articles and conference papers, concerned with the management and implementation to EDI technologies, published between April 1986 and September 1991. The sample was taken from a wide variety of international sources.

It was decided that the most suitable technique for investigating the literature would be a form of content analysis (Weber, 1985; Krippendorff, 1980; Stone et al, 1969; Berelson, 1952). Content analysis is a research methodology that utilises a set of procedures to make valid inferences from written and/or verbal communications. The technique of content analysis is described in full in section 3.5.1. Its use is beneficial to this study because it will help to reflect a set of values or cultural patterns of a particular population. Furthermore, its application in a number of areas has demonstrated its ability to elicit the attributes and interests of specific groups. Content analysis of an article relies on an assessment of the key words, phrases and concepts found for each article. This technique has been employed by incorporating an adaptation of the Multiple Perspective Concept, proposed by Linstone (1981 & 1984).

Each paper or article reviewed in the sample was analysed in terms of the nature of the content, an assessment of the target audience and an understanding of the author(s) affiliation. This results in three sets of information which may be analysed separately or combined in a number of permutations to further the analysis.

Each paper reviewed was analysed in relation to the following criteria:

i) Nature of the content

The purpose of this criterion is twofold. Firstly, it is necessary to assess the overall perspective of the paper. This reflects a dichotomy between a technical perspective and an organisational or business needs perspective. Clearly, this contributes to proposition 2 (section 2.3). This is then followed by a more focused approach which is designed to explore the specific subjects or topics raised by each paper. The purpose of this second stage is to look deeper at the common themes which may exist. The categories and themes which emerge from the analysis are explored in section 5.4, below.

ii) Author's affiliation

Authors are assessed on information about their job titles, company or academic affiliations, and any other relevant biographical details. This may be difficult to obtain in certain circumstances where such information is not made available. It is not suggested that the author's personal motivations or interests may be uncovered from the limited information available. However, it is suggested that their affiliation will influence the nature of their work and play a role in the nature of the output they produce.

iii) Target Audience

This criterion attempts to establish who the intended target readers are. The purpose of this is to assess whether common audiences exist and who are papers being produced for. The relevance of this criterion is to stress the importance of understanding who is effectively "consuming" the information presented in papers on EDI. Potential indicators of the target audience are the type of publication and its associated readership and/or key words which address certain audiences. However, it is recognised that this criterion may prove problematic and, as with author affiliation, may be difficult to obtain in certain circumstances where such information is not made available.

5.4 Presentation Of Results.

This section presents the results of the analysis of the sample and explores some of the salient themes. Initially, each criterion is reviewed separately. This is followed by a comparison of criteria.

Throughout this section cross-references are made to examples from the sample. Where a reference appears in square brackets (e.g. [P6]) it can be cross-referenced with the list provided in Appendix I.

5.4.1 Findings for the Main Criteria

The Content of EDI Papers

A study of the overall perspective reveals that the majority of papers are written from a technical perspective (see table 5.1). Categorisation was achieved by assessing the overall subject matter for each paper. For example, a paper outlining a current standards initiative would be classified as *technically driven.* Likewise, a paper which outlines an approach to implementation and addresses only the technical aspects of implementation would fall into the same category [P1]. By contrast, the *business needs driven* category incorporates the papers which are written from an organisational perspective. This includes papers where the focus of concern is some organisational issue, for example, the implications EDI for organisational structure or the opportunities for improved business practice [P2]. The *mixed perspective* category refers to articles which were written from a technical perspective but make reference to organisational issues. For example, a case study of an EDI implementation which had some unforeseen organisational ramifications [P3].

Article Perspective	Frequency	Percent
Business needs driven	40	13.7 %
Mixed perspective	60	20.5 %
Technically driven	193	65.9 %
TOTAL	293	100.0 %

Table 5.1 - Article Perspective

Authors' Affiliation

Two basic categories are applicable for describing the authors' affiliations. This represents a simple dichotomy between a *business needs affiliation* and a *technological affiliation.* Job titles, such as marketing manager or group procurement controller, generally reflect a business needs affiliation, whilst titles such as information technology director or systems analyst generally reflect a technological affiliation. The nature of an author's organisation is also considered. For example, authors who work for computing vendors are considered to have a technological affiliation, whilst someone based in a university business school would fit the business affiliation category. Usually, a combination of job title and company connection are required before affiliation may be assessed. The results of the authors' affiliation can be seen in table 5.2:

Authors' Affiliation	**Frequency**	**Percent**
Business needs	56	19 %
Technological	176	60 %
Not known or not enough information.	61	21 %
TOTAL	293	100.0 %

Table 5.2 - Author's Affiliation

Target Audience

The target audience may be viewed as two distinct groups: organisational and senior management versus IT professionals. The numbers of papers comprising each category may be seen in table 5.3. Information technology and computing specific journals are aimed at IT professionals and accordingly attract a readership drawn from this profession (see [P4] for examples). By contrast, there are a number of industry specific publications which tend to attract management audiences drawn from companies in the relevant industry (see [P5] for examples). In addition, academic publications may be classified in relation to the audience they seek to attract. For example, the Journal of European Business as a management audience and the Journal of Systems Management as IT professional audience.

Target Audience	Frequency	Percent
Organisational or senior managers	49	17 %
IT Professionals	152	52 %
Not known or no clear audience.	92	31 %
TOTAL	293	100.0 %

Table 5.3 - Target Audience

The Relationships Between Criteria

Table 5.4 shows the crosstabulation of article perspective with authors' affiliation. What is apparent from this table is that authors with a technical affiliation are responsible for writing papers which are technically driven. Furthermore, this represents the dominant approach to the EDI literature. By contrast, there is only a small cluster of needs driven papers written by people with an organisational affiliation.

Author ➔ Article	Business needs	Technical	Row Total
Business needs driven	30	6	36
Mixed perspectives	15	28	43
Technically driven	11	142	153
Column Total :	56 24%	176 76%	232 100%

Number of Missing Observations = 61

chi-square = 93.5
Degrees of Freedom = 4
Significance = 0.05

Table 5.4 - Crosstabulation of Article Perspective By Authors Affiliation.

Table 5.5 shows that, from 1987 to 1990, there has been a significant shift away from the technology driven paper/technological author approach and the number of papers addressing organisational issues has increased. This may reinforce the premise that as the technical issues become resolved and users become familiar with the capabilities of EDI, they are able to formulate a more constructive exploitation of EDI that better matches their business needs.

ARTICLE→ YEAR	Needs Driven	Technical with needs	Technically Driven	Row Total
1987	2	1	13	16
1988	4	11	27	42
1989	13	21	50	84
1990	18	23	57	98
Column Total	37 15.4%	56 23.3%	147 61.3%	240 100%

chi-square	*D.F.*	*Significance*
17.161	*6*	*0.071*

Table 5.5 -
Crosstabulation of Year of Publication by Article Perspective
(for complete years only).

Of notable interest is the growth of EDI papers which have been published in journals targeted at senior management. A selection of these papers attempts to take a multi-disciplinary approach to EDI, by appraising technical issues with respect to business needs. However, the approach to solving business needs often falls into the category of technical 'hype'.

5.4.2 Common Issues and Themes in the Approach to EDI

Closer analysis of the papers which discuss business needs issues reveals a number of common themes.

The technological panacea

The approach adopted in a substantial number of papers is to present EDI as a panacea for a wide variety of business problems. This offers a deterministic view of the technology. Organisational and inter-organisational considerations are either over-looked or not considered relevant. This also suggests that many authors perceive technical development in terms of a simple technology push model [P6]. The only occasions where this situation differs are where EDI is considered in conjunction with a current management approach or philosophy, for example just-in-time approaches [P9].

The speed and importance of technical change

The idea that EDI represents a technological panacea is often accompanied by dire warnings concerning the consequences for a business which fails to implement the technology. The EDI literature frequently presents the perspective that organisations should be afraid of being left behind technically. Some stress the importance of what they see as 'missing the boat' [P7]. The technological threat is further emphasised in [P8] where it is stressed that companies should decide whether they are in 'the EDI club or out':

> *"For instance, a company that supplies parts to a manufacturer* [using EDI] *on a regular basis will have to switch to EDI, or lose out to a competitor that's already using it"* [P8]

Economic perspectives on EDI justification.

Whilst a number of business needs papers attempt to emphasise the strategic benefits of EDI, they all share the same inability to provide business justification. Invariably, justification relies on the automating aspects of the technology which can be quantified in terms which business can accept more readily, for example, saving labour costs, and reducing communication or warehouse costs [P2, P6, P10].

Problem identification

In addition to the themes already discussed, it is common for business needs papers to identify the problems associated with EDI in terms of either technical problems or legal problems. Technical problems focus on issues such as the standardisation of message formats, selecting communications protocols etcetera. Legal problems focus on the legal validity of paperless trading. Whilst the latter problem constitutes a business concern, the focus is clearly beyond the bounds of a particular company application of EDI [P11].

When consideration is given to the entire sample, a further theme emerges:

The technical perspective of EDI implementation

The implementation of EDI is commonly seen in terms of a series of technical stages. This usually adheres to traditional systems design methodologies [P13]. EDI implementations are seen as being completed when they are technically completed. This study was unable to find one paper or article which considered user involvement in the design process, or mentioned the need for pre or post implementation training for users. Likewise, user acceptance of EDI systems does not seem to be of concern [P13, P14].

5.5 Conclusions to the Chapter

The purpose of this study has been to explore proposition two through the assessment of the literature concerning EDI, as representative of a current innovation in information systems and technologies. The relationship between the current literature and the values and perceptions of IT professionals can be seen in figure 5.1.

5.5.1 Proposition Two

The results of the survey demonstrate that there is considerable evidence for the proposition that technology management is dominated by a technical and economic perspective, with little or no consideration of other influences.

The premise, that the EDI industry is technically driven and not, as yet, business needs oriented, has a strong foundation. The dominance of authors with a technical affiliation and the plethora of technically driven papers is evident. The presentation of EDI as a panacea and the emphasis on the consequences of failing to adopt this technology demonstrate a strong technocentric and deterministic element in current thinking. This may also reflect that, as a technology, EDI is still in the initial stages of understanding and coming to terms with the business realities. A great deal of technological hype is to be found in the EDI literature, where the technology is oversold as a technical solution. This supports Winfield's (1991) claim that business culture has become oriented towards finding a technological fix. It is suggested that there is a need for the EDI literature to move from a focus on *technical hype* towards a period of *business realism*. Accordingly, the issue of business needs requires further attention, but should not overshadow the technical issues entirely. The trend toward greater consideration of organisational issues, identified in table 5.5, is to be welcomed. However, the author would prefer to see a more positive shift towards organisational issues within the EDI community, and for this to be reflected in publications. At present, there is still no evidence in this analysis for such a strong trend.

As the development of EDI continues, it is expected that it will exhibit fewer characteristics of uncertainty as the industry arrives at acceptable standards, resolves technical issues, and strives for a greater understanding of the organisational and business implications of EDI. It is also expected that as the shortfall between the technical capabilities and promised realities becomes apparent, a more realistic, business needs focused approach will prevail.

Much of the EDI literature addresses the wrong level of management and issues of business advantage are dictated by the technology, rather than distinguishing how EDI fits an organisation's business plan. Papers are frequently targeted at the information systems professionals within companies who share a common technological perspective. Less than one in five papers are to be found in publications which have a readership comprising of organisational managers. However, it must be pointed out that the satisfactory identification of target audience proved problematic, hence the high percentage of 'not knowns'.

5.5.2 Consideration of Propositions One and Three

The vast majority of papers on EDI overlook the business ramifications and organisational upheaval which may be generated by an EDI implementation. There is the deterministic assumption that the introduction of EDI will create positive change for the implementing organisation. Whilst this will inevitably be true for a substantial number of companies, the reverse scenario is considered equally as probable. By assuming a technological perspective, there is a failure to address specific organisational situations. In his paper, entitled "The Growing Risks of Information Systems Success", Vitale (1986) discusses how the adoption of earlier computing technologies led to changes in the industry structure which were not always favourable to the adopting company.

The EDI literature has demonstrated a concentration on technical skills which is believed to reinforce the professional ethos and culture amongst IT professionals, described in section 2.4. There is an obvious need to resolve technical matters in technology writing. However, an over-emphasis on technical matters appears to generate a gulf between IT professionals and organisational managers. The reinforcement of the technical orientation of IT staff encourages organisational barriers, whilst organisational management are unable to relate their businesses to this literature.

Furthermore, the business issues, which are overlooked in the EDI literature, involve changes to the power base within an organisation. Whilst the literature is keen to stress the radical changes which EDI will generate, the organisational consequences, such as possible reductions in numbers employed and deskilling of work tasks, are not considered. However, the potential for EDI to strengthen the power of IT professionals has not gone unnoticed. Dunleavy (1988) states that EDI requires a centralised approach, even if an organisation has a very decentralised management philosophy [P12].

5.6 Summary

This chapter has explored the central theme of proposition two, namely that a technical and economic perspective is dominant in the management of technology. A body of current literature within the computing technology field has been analysed. The current literature is believed to represent an output of current thinking in the IT field and, in turn, informs current practice. The literature selected focuses specifically on electronic data interchange, as being representative of a current innovation in information systems and technologies. The analysis was designed to explore several facets including the author's affiliation, target audience and content of the papers and articles in the sample.

The conclusions reinforce proposition two, that technical and economic perspective dominates technology management, and that an over-emphasis on technical issues in the literature informs the values and perceptions which IT professionals bring to their relationship with organisational users. This study also provides supplemental evidence for propositions one and three.

CHAPTER SIX

Understanding the Work Motivations of IT Personnel

6.1 Introduction

The research in this chapter continues to explore Proposition 2, in particular, that a technical perspective is prevalent in information technology management, with little or no consideration of other influences. This perspective is investigated by studying a selection of job specifications for information technology related positions. This is expected to reveal the criteria by which IT personnel are selected and the aspects which are considered important in their work. In the author's opinion, for an organisation to fully exploit information technology, it requires the IT Function to satisfy the needs of users (by department and individual needs). This demands a certain perspective amongst IT staff and professionals. Therefore, the concern of this chapter is to determine what ethos drives the work roles of IT professionals.

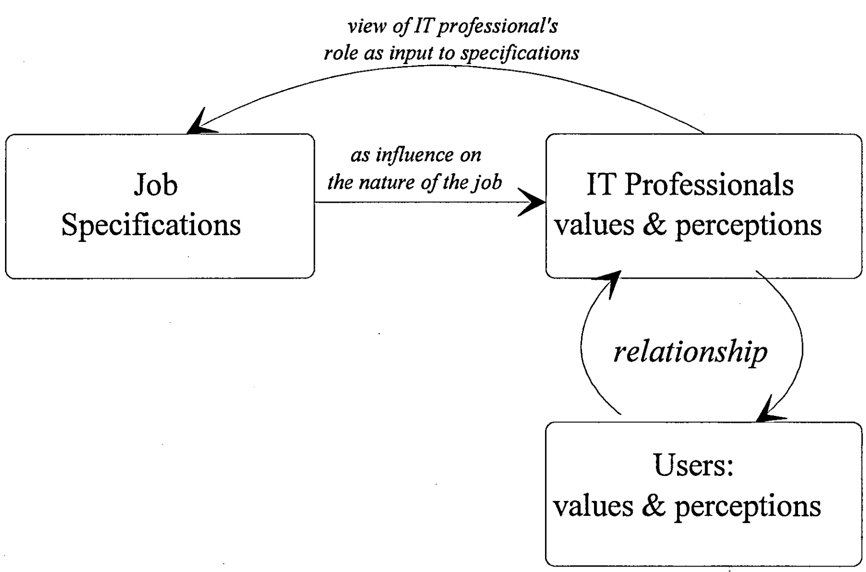

Figure 6.1 -
The Relationship of Job Specifications to IT Professional's Values and Perceptions

The survey is also expected to contribute to our understanding of propositions 1 and 3 as pertinent issues, such as IT strategy and professional culture, are likely to be encountered.

6.2 Design, Method and Means of Analysis

A sample of job specifications was obtained by responding to advertisements in a series of publications from April to October 1992. A corresponding sample was taken for a similar time period in 1993, which enabled a limited longitudinal analysis to be undertaken.

Each job specification was analysed with the aim of identifying the technical and business specifications. The job specifications were then grouped. The sub divisions were based on job title, salary, and general nature of the duties. This resulted in three distinct clusters: IT Management Roles, Technical Positions, Support Work.

Further to this, basic content analysis[1] (Weber, 1985; Krippendorff, 1980; Stone et al., 1969; Berelson, 1952) was conducted on the text of each job description. Five search criteria were selected for this purpose :

a) User Requirements.

This included specific references to the investigation of users' requirements and needs. In cases where this is evident the users are the focus of the job's duties, guiding the fulfilment of the technical activities. Two illustrations of such duties are given:

> *"To investigate user requirements for computer systems and draw up specifications of those requirements"* [92:01]

> *"To discuss with potential users their detailed software requirements"* [92:44]

b) Liaison.

Where the job specification involved duties that required the employee to liaise with staff (management and/or users) at different levels <u>outside</u> the IT Function. This differs from a) in that the emphasis is more on the co-ordination of IT and organisational goals, rather than an organisational needs "pull".

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[1] For a full description of the use of content analysis please refer to chapter 3, section 3.5.1.

"To liaise as appropriate with users of the computing and network services" [92:14]

"To liaise with senior and middle managers to monitor and evaluate current service delivery and to plan future service developments" and *"to ensure liaison directly with users for the purpose of maintaining and improving user satisfaction"* [92:64]

c) New Developments.

Where attention is paid to keeping up with the latest information technologies. In several cases a key duty centres on the theme of 'keeping abreast of technical developments', for example :

"To keep abreast of current developments within the discipline of computing through attending training courses and by reading appropriate published material" [92:05]

d) Technical Duties.

This is a cover-all phrase to identify cases where the specification outlined particular duties which focused entirely on the technology. This covers activities such as the installation and preparation of computer systems, fault diagnosis of hardware and software, documentation practices etcetera. For example:

"To be responsible for documenting all software developed in-house" and
"To be responsible for the correct restoration of data following any breakdown of the system" [92:66]

e) Strategic Perspective.

Where the specification contained duties that demanded that the employee either develop an IT strategy or implement change in accordance with the strategy. In the majority of management cases it was clear that some attempt had been made to marry IT strategy to long-term organisational objectives. A typical job specification would be:

"To develop a recognised information technology/information systems strategy for the Housing Service" [92:69]

Further to the initial examination, it was considered necessary to assess the job specifications for evidence of *communication.* Quite simply, this refers to the qualities of the individual which are considered necessary. This requires that IT staff are able to 'tune' themselves to the language and needs of users. Two further search criteria were added to identify such communication qualities. In the majority of cases this demanded analysis of the person specification, where provided, as an additional input to the study.

f) Inter-Personal Skills

Where the specification required the post holder to display inter-personal skills, i.e. the general ability to communicate ideas to other members of the organisation.

> *"the ability to communicate effectively both orally and in writing and to establish professional relationships with all members of the organisation"* [92:99]

g) IT Specific Communication

Where communication skills are required that particularly address the need to communicate effectively with colleagues who are not necessarily from IT backgrounds. For example:

> *"The post holder must be able to communicate with people from diverse backgrounds with varying IT knowledge base"* [92:63]

This should be specific to organisational members only and is not to be confused with external communication with suppliers, consultants etcetera. The purpose of this search criteria is that it shows a recognition of the potential communications barrier between users and IT professionals and, more importantly, illustrates that it will be used in the selection process.

The justification for these criteria is that collectively they allow for the identification of the key themes and motivations of IT work and the degree to which the IT function has moved towards a greater user/organisational focus and away from the traditional technical dominance.

6.3 Results and Modelling of Job Specification Clusters

This section presents the results of the analysis of the sample of job specifications. The first stage of analysis structures the job specifications into clusters of 'like' roles. Further analysis is conducted over the whole sample and by individual job clusters. This is done with respect to the search criteria, described above.

Throughout this section evidence taken from individual job specifications will be referenced by referring to the search year, followed by a chronological classification, for example [92:04].

Job Clusters

Three generic roles were suggested by the sample of job specifications. These are:

IT Management Roles

IT management roles are predominantly responsible for IT policy/strategy, man-management of IT staff, and overseeing the day to day running of IT facilities which includes the activities of the Technical positions and support workers (see below).

Technical Positions

Typically these jobs encompass the range of system development, programming and communications networking roles that require a great deal of technical knowledge. In all the cases studied the tangible nature of technical positions made the responsibilities of the job easy to specify.

Whilst such jobs do not require any direct contact with users, the results of their work activities will have indirect implications for the support of those users. It is the author's belief that organisations require these jobs and that their technical bias is necessary and acceptable given that it is in conjunction with user driven support work and encompassed within an overall strategic approach to IT.

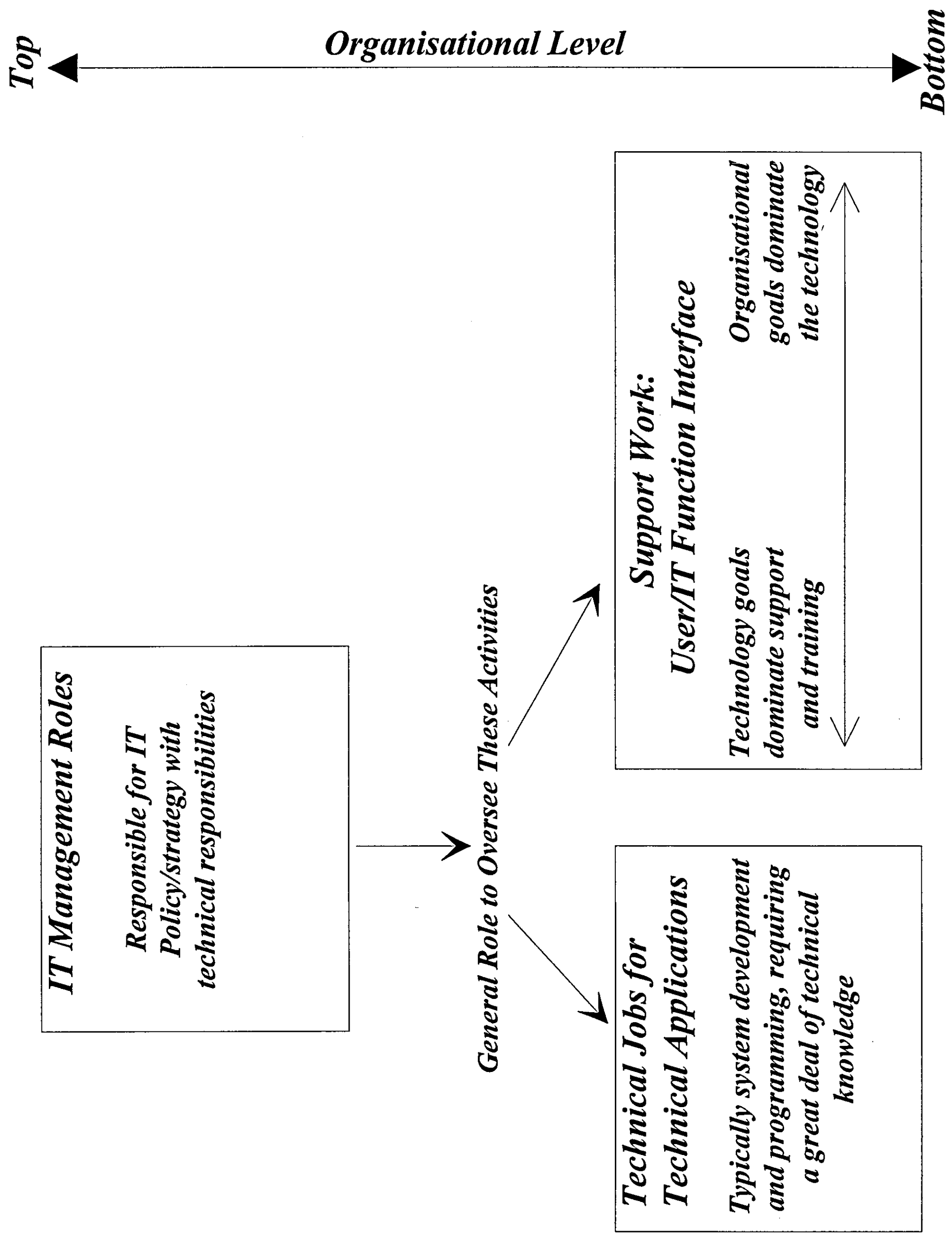


Figure 6.2 - The Relationship Between IT Job Clusters

Support Work

This is by far the largest group. Support work posts are the user 'interface' with the IT department. The role of these jobs is to provide support for users by supplying them with the necessary technology and knowledge/skills to aid them in their work. Support may range from ad-hoc troubleshooting through to formal training courses. The success with which this is achieved will be represented in the degree to which users assimilate information technology into their tasks.

It is with this group that there is a clear dilemma. The nature of the work is to provide a service and as such the IT function needs to be 'customer orientated'. In addition, support workers will need to have a sound understanding of the technical issues if they are to be of any assistance to users. Given this framework, the sample of job specifications shows a wide and varied range of duties. At the one extreme technological goals dominate support and training, and at the other organisational goals dominate the technology. This is also evident from the content analysis. From the definitions of the responsibilities of support positions it is clear that technical roles are easily described, but the duties which require human contact are often poorly specified.

> "*Offer support for both staff and students of the department*" and "*assist in computer laboratory workshops*" [93:62]

The relationship between the job clusters is shown in figure 6.2, whilst table 6.1 shows the numbers of jobs in each cluster for each sample year.

		1992		*1993*	
Value Label	**Value**	**Frequency**	**%**	**Frequency**	**%**
Technical Positions	1	26	23.9	20	23.5
Support Work	2	58	53.2	47	55.3
IT Management Roles	3	25	22.9	18	21.2
TOTAL		109	100	85	100

Table 6.1 - A Breakdown of the Job Clusters Referred to in Figure 6.2

Analysis of the Search Criteria

a) User Requirements

		1992		*1993*	
Value Label	**Value**	**Frequency**	**%**	**Frequency**	**%**
No users requirements	0	81	77.9	73	85.8
Users requirements	1	23	22.1	12	14.2
Missing Values	9	5	4.6	0	0
TOTAL		109	100	85	100

Table 6.2 - Frequency of 'User Requirements'

In only 15% of cases were there references to assessing the requirements of users. This suggests that the majority of support work jobs allow the dominance of technology without due consideration of the user populace.

b) Liaison

		1992		*1993*	
Value Label	**Value**	**Frequency**	**%**	**Frequency**	**%**
No liaison	0	58	55.8	53	62.4
Liaison	1	46	44.2	32	37.6
Missing Values	9	5	4.6	0	0
TOTAL		109	100	85	100

Table 6.3 - Frequency of the Liaison Criteria

There is a greater effort to co-ordinate IT and organisational goals, however, the jobs where this is specified are still in the minority (40%).

c) New Developments

		1992		1993	
Value Label	**Value**	**Frequency**	**%**	**Frequency**	**%**
No New developments	0	84	77.1	72	84.7
New Developments	1	20	18.3	13	15.3
Missing Values	9	5	4.6	0	0
TOTAL		109	100	85	100

Table 6.4 - Frequency of 'New Developments'

d) Technical Duties

		1992		1993	
Value Label	**Value**	**Frequency**	**%**	**Frequency**	**%**
No Technical Duties	0	5	4.6	11	12.9
Technical Duties	1	99	90.8	74	87.1
Missing Values	9	5	4.6	0	0
TOTAL		109	100.0	85	100

Table 6.5 - The Occurrence of Technical Duties

In all but 16 cases, over the two years of this study, were there references to technical duties. It would appear that this is the core of IT job specifications. The view held here is that this is the result of the historical development of information technology and the ease with which technical duties can be identified and defined.

e) Strategic Perspective

		1992		1993	
Value Label	**Value**	**Frequency**	**%**	**Frequency**	**%**
No Strategic Perspective	0	80	76.9	70	82.4
Strategic Perspective	1	24	23.1	15	17.6
Missing Values	9	5	4.6	0	0
TOTAL		109	100	85	100

Table 6.6 - Frequency of a Strategic Component

Understandably, over the whole sample the level of strategic perspective is fairly low. The necessity to consider strategic and long term objectives increases with organisational seniority.

Figure 6.3 -
Crosstabulation of Cluster By Strategic Perspective for 1992

Cluster	Code	No Strategic Duties	Strategic Duties Required	Row Total
Technical	*1*	25	0	25
Support	*2*	48	6	54
Mngt roles	*3*	7	18	25
		80	24	104
Column Total		79%	21%	100%

chi-square = 45.56 D.F. = 2 Significant to 99%

The crosstabulation above (figure 6.3) displays a breakdown of cases where the strategic perspective is evident by the job cluster. The tendency for strategy to be considered at a higher level is born out, however, the percentage of management cases where IT strategy is still not considered is alarming. Please note that more management cases are required to properly justify this. Figure 6.4 repeats the analysis for the 1993 sample.

Figure 6.4 -
Crosstabulation of Cluster By Strategic Perspective for 1993

Cluster	Code	No Strategic Duties	Strategic Duties Required	Row Total
Technical	*1*	20	0	20
Support	*2*	43	4	47
Mngt roles	*3*	8	10	18
		71	14	85
Column Total		83%	17%	100%

chi-square = 18.16 D.F. = 2 Significant to 99%

f) Interpersonal Skills

		1992		*1993*	
Value Label	**Value**	**Frequency**	**%**	**Frequency**	**%**
No Interpersonal Skills	0	52	53.1	18	27.0
Interpersonal Skills	1	46	46.9	49	73.0
Missing Values	9	11	-	18	-
TOTAL		109	100	85	100

Table 6.7 - The Demand for Interpersonal Skills

g) Communication Skills (user specific)

Table 6.8 clearly demonstrates that the ability to communicate with users is not recognised as an important quality. There is no significant difference between the 1992 and 1993 figures.

		1992		1993	
Value Label	**Value**	**Frequency**	**%**	**Frequency**	**%**
No Communication Skills	0	82	83.7	55	82.1
Communication Skills	1	16	16.3	12	17.9
Missing Values	9	11	-	18	-
TOTAL		109	100	85	100

Table 6.8 - The Demand for IT Specific Communication

Analysis by Job Cluster

	Technical Jobs	Support work	Managerial Positions	Overall
User Requirements	3%	23%	21%	18%
Liaison	16%	46%	58%	41%
New Developments	11%	22%	14%	17%
Technical Duties	100%	95%	76%	92%
Strategy	0%	10%	60%	21%
Inter-personal skills	27%	61%	77%	57%
IT specific communication	0%	22%	21%	17%

Table 6.9 - Positive Occurrences of Each Search Criteria (a to g) for each Job Cluster

Analysis of Support Work Specifications

Further analysis of all the support work specifications was conducted to see whether these positions differ from the average IT related job specifications. The justification for this is that it is the support group jobs which reflect the IT staff - user interface, i.e. it is IT support service employees who are the direct point of contact for users.

Examination of the first five criteria (a to e) revealed that, with the obvious exception of 'strategic criteria', there was no significant difference between the figures obtained for all the jobs in the survey and those which relate to support work in particular. The bulk of the strategy component is to be found in managerial roles. This can be seen in figures 6.3 and 6.4. Of the remainder, the largest difference occurred with respect to the identification of user requirements (see table 6.10). It is reasonable to expect that addressing user requirements would be more likely to be the focus of support work than the other IT job classifications, where attention is directed toward managerial and technical issues. However, the difference only represents a 5% swing in favour of this category which can in no way be seen as significant.

Value Label	Support Work	Overall
No user requirements	77%	82%
User requirements	23%	18%

Table 6.10 - User Requirements in Support Work

Again, it seems reasonable to expect that support work specifications will contain a greater emphasis on communication skills, given the need to interact with users directly. By contrast, managerial positions and the behind-the-scenes technical activities tend to be more removed from direct contact. Table 6.11 shows the percentages of specifications which include 'IT specific communication'. This is where communication skills are required that particularly address the need to communicate effectively with colleagues who are not necessarily from IT backgrounds. What is most evident from these figures is that support work specifications are less likely to require IT specific communication abilities than the average IT job specification.

Value Label	Support Work	Overall
No Communication Skills	78%	83%
Communication Skills	22%	17%

Table 6.11 - IT Specific Communication Skills in Support Work

The analysis of the support work specifications has revealed the homogeneity that appears to exist between all IT jobs. Excluding the strategic issue, support activities do not appear to be recognised as different to other IT jobs or seen as a special case demanding a different emphasis on skills.

6.4 Discussion and Conclusions

This section draws together the findings from this study and reviews them from within the propositional framework. These conclusions are then related to the literature to place them in a wider debate on the 'gap' between users and IT professionals.

6.4.1 Conclusions

This study suggests that technical and economic issues are pervasive. The vast majority of job specifications analysed expressed the desire for specific technical skills. User support is seen in terms of satisfying a set of technology requirements, by installing and maintaining IT facilities, rather than enquiry into user desired IT requirements or helping in the application of IT in the aftermath of installation. The need to satisfy technical skills is understandable and would be acceptable, in the author's opinion, if it was combined with some form of user oriented skills requirement, in the form of user needs assessment and the recognition that effective user communication requires specific individual skills on the part of IT personnel. This scenario provides further reinforcement of proposition 2.

The apparent desire to employ IT staff who are shaped by a technical and economic perspective is evident from the analysis above. This is particularly concerning when it effects IT support staff, responsible for maintaining the relationship with users. It is, perhaps, not surprising that this gives rise to the development of a professional ethos, continually reinforced by selection practice. This professionalism, identified in proposition 3, if not directly addressed ,will only serve to compound the situation.

This study makes useful contributions to proposition 1, that there is a lack of IT and business integration. The study revealed that IT staff are not, on the whole, expected to relate to management and user positions. Strategic issues are considered at higher levels within organisations, however, the percentage of IT related management positions where IT strategy is still not considered is alarming. It would appear reasonable to assume that between 35% and 45% of IT management roles do not explicitly require IT to be considered beyond a purely operational or functional perspective. More urgently, this situation does not appear to have improved during the two years of this study.

6.4.2 Bridging the User - IT Professional Gap

Two important questions are raised as a result of this study. Firstly, how does the job specification effect the type of applicant eventually accepted? Secondly, in what ways do the demands of a job specification impose on the way the job is undertaken, i.e., does setting certain duties predetermine the way the job is approached? Both of these questions provide grounds for further research.

Furthermore, such questions only reflect on one side of the chasm between the needs of user departments and the performance of the IT Function, namely, the inability for IT staff to understand the organisational and political nature of their users. The other side of this argument focuses on the extent to which user departments should go in order to understand the technology. Which 'side' should adapt and how should such changes be managed?

Several authors have suggested new approaches to the management of IT and given particular consideration to means of closing the 'gap' between users and IT staff. This discussion will touch on the most interesting and useful developments.

Earl and Skyrme (1990) have reviewed the potential for hybrid managers, defined as *"a new breed of managers who blend information management skills with general management"*. They detail the many different ways in which hybrid managers have been created. In essence, this involves either locating IT staff in a business environment or, more commonly, endowing business personnel with the necessary IT skills. Their work suggests that where specific examples of "hybridisation" have been reported, significant improvements in the development and quality of IT innovations have been claimed. In addition, their work revealed that organisations are not doing enough to address human resource issues associated with IT staff (Earl and Skyrme, 1990; *cf.* Skyrme, 1992; Palmer, 1990). The job specification study contributes to such a conclusion. However, Earl and Skyrme sound a note of caution by concluding that :

> *"Hybrid managers alone are unlikely to be enough. The organisation needs to create the right climate and use whatever other bridging mechanisms are appropriate in combination".*

A study conducted by City University Business School (1992), based on a Delphi forecast of the uptake of new technology within the financial services sector in the 1990's, identified areas where skill shortages would occur. In addition to the technical skill requirements a variety of wide-ranging general skills were outlined. Particular emphasis was placed on the need for IT staff and business users to share common skills and to overlap, what has traditionally been considered, each others' domain.

Several authors have suggested the use of quality management approaches and cross-functional teams (Feeny et al, 1989; Cache et al, 1988; Kerr, 1989). These represent a variety of approaches which attempt to mix IT staff and business users so that practical applications of IT are more easily identified and developed. The focus of such approaches is inclined towards more strategic developments and does not represent in any way the day to day, functional interaction between individual users and IT personnel. Feeny et al (1989) conclude that such approaches are flawed due to the absence of positive attitudes on the part of IT and business professionals to partnership and collaboration.

To conclude, as yet there is no clear view of the most successful way to bridge the user/IT staff gap. Measures, like those described, are frequently frustrated by the range of organisation diversity. The opinion held here is that the key lies with the need for IT and business communities to change their existing beliefs, attitudes and behaviours. One potential way of contributing to this would be to review the job requirements of the range of IT personnel.

6.5 Summary

This chapter forms the third study of the delivery of IT services and explores the central theme of proposition two, namely that a technical and economic perspective is dominant in the management of technology. A sample of job specifications for IT related positions were analysed. The sample was taken over a two year period. Analysis was conducted by looking for seven search criteria. The search criteria were designed to establish the specific attributes which each job specification contained, based on the premise that the job specification acts as an influence on the values and perceptions of IT professionals.

In section 6.3, three generic clusters of IT work are identified and the analysis of the search criteria is presented. Particular attention is given to the support work positions as these jobs represent the interface with users. Overall, job specifications show the dominance of technical work related duties and the absence of user or business focused duties. Finally, some of the alternative structures for the IT support function are discussed.

CHAPTER SEVEN

IT As a Service Delivery Issue: Exploring User Perceptions

7.1 Introduction.

The purpose for conducting this survey is to understand better what issues computer users perceive to be important in the delivery and quality of the information support services which they use. It represents the first study in this thesis to address the receipt of IT services (see figure 3.1). This survey is intended to shed light on user perspectives of their relationship with the IT professionals in their organisation through the service they receive.

Given the need to question a relatively large number of users within a single organisation the most practical approach was to develop a self-completion questionnaire (discussed in detail in section 3.4.2). As such a questionnaire must generate the required data on its first application to a *real* scenario, it was necessary to work through an elaborate piloting and assessment procedure to ensure the desired responses were obtained. The piloting process will be discussed in more depth in section 7.3.

Section 7.2 addresses the concepts of service delivery and outlines their relevance to IT support operations and the user-IT professional relationship.

7.2 The Application of Service Management Concepts to IT.

Introduction

The use of service management concepts is an important departure from previously accepted methods of analysing IT management, which may herald fresh insights and new methods of planning IT. In Section 2.5 the key characteristics that distinguish service production from goods production were developed. This was illustrated with particular relevance to the delivery of IT support services. To recap, the assimilation of IT by users has a number of characteristics which imply it should be seen as a service. The assimilation process places emphasis on how IT is provided (the intangible) as opposed to what is provided (the tangible). Furthermore, assimilation requires considerable, ongoing interaction between IT professionals and users. Successful assimilation is believed to emerge from this relationship.

Chapters 4, 5 and 6 all addressed the delivery of IT services. One common theme was that IT departments have a tendency to respond to computer industry generated ideas and technologies and funnel these developments through to users (section 2.3 and the conclusions to chapters 4, 5 & 6). Consequently, the process of IT adoption and assimilation is frequently not satisfactorily applied to users or business scenarios. Frequently, the values and perceptions of the service deliverers place a far higher emphasis on technical considerations so that other issues, possibly reflecting organisational or service related factors, are overlooked. As service products are generally based on consumers' perceptions, attempts to define them have been based around customer needs. Therefore, it would appear logical to attempt to understand how users conceptualise and perceive the service they receive, as distinct from the perceptions of the IT professionals, as service deliverers. This may be seen as reflecting an assessment of the criteria users see as being important to service delivery. However, Rands highlights some of the perceptual difficulties and incongruences between the two parties:

> *"It may be easier for users to assess functional rather than technical quality of an IT service, but difficult for IT specialists to measure functional quality; therefore mismatches may concern the perceived relevance of technical and functional elements in the IT service" (Rands, 1991).*

Towards an Operationalisation

To operationalise the research propositions, there is a need to consider more fully two important aspects: perception of the service needed and difficulties in assessing quality of service delivery. These considerations lead to an approach to the measurement of service quality and delivery (SERVQUAL) which are then made operational through a questionnaire design (section 7.3.2). Issues of piloting, coding, preparation for analysis and implementation are given in sections 7.3.3 and 7.3.4.

Focusing users on the service they receive, rather than the technology makes it possible to compare user opinions. This is particularly beneficial in cases where the technology employed by different users is markedly different. Furthermore, this approach addresses the *process* of IT assimilation, rather than just the tangible evidence. Accordingly, it is believed more suitable for exploring the perceptions which users bring to this process.

In order to explore the User - IT professional relationship from the service receipt side it was necessary to conduct a survey of a group of users (as service receivers). For practical reasons two companies were selected for this study (see section 3.4.2). Through the use of a structured questionnaire, encompassing elements of a service delivery model, it was possible to ascertain the congruence between how users and IT staff perceive or conceptualise service quality and delivery.

7.3 Design and Use of the Questionnaire.

7.3.1 Introduction

The questionnaire has been constructed in three parts. Part one addresses user related factors, whilst parts two and three focus on a model of services quality and delivery. Before outlining the design of parts 1 to 3, it is important to reflect on the relationship between the propositions, discussed earlier, and the questionnaire.

Unlike the development of the questions in Chapters 4, 5 and 6 (service delivery studies), where questions were generated directly from the propositions, this study has attempted to understand better the user perspectives of their relationship with the IT professionals. The reasoning for this is discussed in the chapter on research design (section 3.4.2). In addition, it is anticipated that by focusing on IT service delivery this will illuminate many of the central themes of propositions one to three.

7.3.2 Questionnaire Design and Development

The Design of Part 1.

The purpose of part one is to a) identify particular characteristics of individual respondents, and b) to allow respondents to express their perceptions of the IT support service they receive. These are discussed in greater detail:

a) Characteristics of individual respondents

Question Number	Question Purpose	Recorded as
1	to record the level of usage in terms of amount of respondent's average working day spent working with computers	a percentage from 0% to 100%.
2	to record the amount of the total time spent working with computers where the respondent's use of applications is at their discretion.	a percentage from 0% to 100%.
3	to assess the respondent's perception of their own level of IT understanding	a Likert scale (1 to 7) from "Novice User" to "Expert User".
4	to assess the level of confidence that the respondent has with regard to their understanding of IT in relationship to the computing tasks they have to undertake	a Likert scale (1 to 7) from "Not very confident" to "Very Confident".
5 a)	to ascertain which of the commonly accepted categories of software the respondent utilises	a tick in the corresponding box alongside a package type.
5 b)	to ascertain the practical application that each package is used for by the respondent	own description of practical application.

b) Perceptions of the IT support service they receive.

In general this section addresses the questions which attempt to obtain the users' conceptualisation of what they view as 'good service' and 'bad service' and subsequent levels of satisfaction with the service they receive.

Question Number	Question Purpose	Recorded as
5 c)	to determine the service requirements for each package type, as the respondent perceives it. This allows the respondent to articulate what they understand by *service.*	description of services required in respondent's own words.
6 a)	to determine which aspects of the service the respondent perceives to be good and bad	qualitative description in respondent's own words
6 b)	to determine *why* the respondent perceives the services as good and/or bad.	qualitative description in respondent's own words
7	In the light of answers given to questions 5 and 6 the respondent is asked to state their level of satisfaction with the service they receive. This is dependent on their conceptualisation of *service.*	a Likert scale (1 to 7) from "highly adequate" to "insufficiently adequate ".

Design of Parts 2 and 3.

Parts 2 and 3 of the questionnaire are derived from the initial ideas expressed by Parasuraman et al. (1985, 1988). The conceptual model of service quality (1985) and the SERVQUAL scale for measuring consumer perceptions of service quality (1988) provide a useful and suitable framework for generating a set of questions applicable to the IT support and service environment. The background to the SERVQUAL instrument may be found in section 3.5.2.

Whilst the model proposed by Parasuraman et al. addresses external rather than internal service delivery, there are similarities between the nature of the IT function - user relationship within an organisation and the more general relationship between an organisation and its external customers.

The service delivery and quality model suggests five categories of interest. I have aggregated four categories from the five to make them more applicable to the internal situation that exists with IT support services.

Several ideas based on the original SERVQUAL questions were not suited to an IT support service scenario, so salient IT related issues were generated using a brainstorming approach. A number of alternatives were suggested and these were whittled down to a workable set of questions through piloting activities.

Development of Questions for the User Side of a Service Model

The following set of statements are based on an adaptation of the conceptual framework proposed by Parasuraman et al (1985, 1988). The groupings, A to D below, have been chosen as being most suitable for application to assessing IT service delivery. Under each heading are initial statements, some have been generated afresh, whilst others have been adapted from those suggested by Parasuraman et al in the SERVQUAL model. All the statements have been customised so that they relate better to IT support services.

In part two users are required to rank four statements (one statement from each of the four categories outlined below), Their ranking is based on the levels of importance they attach to each statement, by direct comparison with the other statements in the group.

In part three users are invited to respond to the statements by marking a Likert scale along the lines of :

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Their responses are given with respect to the IT support services they receive. This allows the respondent to consider the statement independently of the other statements.

A. Tangibles

This includes the tangible evidence of a service, generally manifested by the technology itself. This directly corresponds to the product versus process and physical versus functional debates (discussed in section 2.5.2). In addition, it refers to support staff activities focused to this end, for example, acquiring knowledge of technical developments in particular fields of computing.

Statements :

(a) Providing the latest up to date software should be the priority of IT support staff (q8.1).

(b) IT support staff should strive to have the state-of-the-art technology (q 9.3).

(c) I believe that IT support staff should direct their efforts into looking for the latest technologies (q10).

(d) The IT support function should provide sufficient maintenance of hardware to prevent faults from occurring (q 16).

B. Reliability & Competence

Reliability encompasses the consistency of performance and dependability of the service provider (i.e. can service personnel be relied on to provide a credible service each time it is required). In addition, the service personnel must possess the required skills and knowledge to perform the service adequately.

Statements :

(e) It is essential that IT support staff understand your problem and can "solve" it first time (q8.2).

(f) It is essential that IT support staff relate to your use of information technology (q 9.2).

(g) It is realistic to expect IT support staff to know what my needs are (q12). *This statement also has relevance to "D" below.*

(h) It is fundamental for IT support staff to understand my problems and find solutions to them first time (q13).

C. Responsiveness & Access

Responsiveness concerns the willingness and readiness of service personnel to provide service. An additional component of this is access. Access encompasses the timeliness of the service (i.e. is it provided when required) and the ease of contact (i.e. is it always possible to contact service personnel when necessary).

Statements :

(i) The IT support function should give you individual attention when required (q8.3).

(j) You should be able to contact IT support staff whenever you wish (q9.4).

(k) It is realistic for me to expect prompt service from IT support staff (q14).

(l) It is acceptable if the IT support function is busy to delay their response to my requests (q15).

(m) They support function should provide IT support at times most convenient for all their users (q18).

D. Empathy, Communication & Understanding

This means keeping users informed in language they can understand and listening to them. In addition, making the effort to understand user needs and having their best interests at heart. This is interesting because of the trade-off between the needs of the individual and the organisation. The personal characteristics of contact personnel are of particular concern with regard to proposition 3. The human skills, often absent among IT professionals, fall into this category (see section 2.4).

Statements :

(n) IT support function should keep you informed of developments in language you can understand (q8.4).

(o) The IT support function should be flexible enough to learn your specific requirements (q9.1).

(p) The IT support function should adjust the language they use to users with different levels of sophistication (q11).

(q) It is unrealistic to expect the IT support function to have the users' best interests at heart (q17). *note : this question is phrased negatively.*

and -

(r) It is realistic to expect IT support staff to know what my needs are (q12). *This statement belongs in "B" above due to its focus on competence, however it also addresses the issue of empathy.*

To summarise:

Category	Part Two Ranking Questions	Part Three Likert Scales
A: Tangibles	8.1 and 9.3	10 and 16
B: Reliability and Competence	8.2 and 9.2	12 and 13
C: Responsiveness and Accuracy	8.3 and 9.4	14, 15 and 18
D: Empathy, Communication and Understanding	8.4 and 9.1	11 and 17

7.3.3 Coding and Analysis Activities

The responses to these questions can then be aggregated , based on a Likert scale. This will be achieved by effectively re-grouping the statements back into the four categories, A to D above.

Much of part one of the questionnaire was analysed and coded using content analysis (see section 3.4.1 for a full description of this technique). Responses to parts two and three (the Likert scales and ranking questions) were recorded in a spreadsheet format to allow for easy aggregation.

A general qualitative appraisal of the more open ended questions provided insight into how users evaluate the service they receive. Furthermore, a variety of crosstabulations and correlations were performed, specifically concerning the educational identifiers (questions 8 and 9), and the usage of IT, both generally (q2) and more specifically (q3). For parts two and three each question was reviewed separately. Following this, questions were regrouped, as designed. Categories were then "measured" and compared according to service dimension. The purpose of doing this was to reveal how the users assess the service they receive, so as to give a clear distinction between the tangible and intangible elements of the questionnaire. Additionally, responses for different groups of respondents were analysed so that differences in organisational position and educational values may be understood.

7.3.4 The Implementation Process.

Piloting activities : An *Iterative design phase* was used to develop questionnaire wording and layout. Based on small groups of no more than three people per questionnaire version, feedback was obtained for each version and corresponding changes made. A new version is then resubmitted to a fresh group of people. The benefit of adopting this approach is that it allows changes to be made fairly rapidly and for a suitable variety of respondents to be utilised. In addition, it is an efficient way to test the questionnaire on a relatively small group of people, rather than using up the supply of 'volunteers' on one version.

Once, a satisfactory version had been created it is was possible to test it on larger groups of real users, based in an applicable organisational setting. The piloting process also included feedback from a number of senior individuals from different organisations, including, financial services (x2), petrochemicals, manufacturing organisation, management consultancy.

Organisational champions. A key element to the success of gaining entry to the organisations was the need to find and nurture an organisational champion. A champion is someone who has an interest in the results of the questionnaire, and who is prepared to "sell" the project to other key organisational actors.

The final questionnaire was implemented inside two organisations; a petro-chemicals company and a financial services company. The findings may be found in section 7.4 and Appendix G, respectively. The UK based petro-chemicals organisation has approximately 100 employees. However, it forms part of a far larger multi-national, parent organisation, receiving and providing a range of operational services to other organisations within the parent's umbrella. The main area of expertise which the organisation provides is predominantly concerned with the oil refining process. All the organisation's employees were given the questionnaire, with the obvious exception of the IT function. Implementation for the financial services company involved contacting IT service users who had requested support from the IT function in the period prior to implementation. Users were targeted from the IT function support log, so the sample of 120 was spread throughout the 3000 strong workforce. It should be noted that both organisations have a formalised IT function.

7.4 Analysis of the User Perceptions Questionnaire for the Petro-Chemicals Company.

7.4.1 Introduction

This section aims to understand how users perceive the service they receive, what services they require (with respect to what is delivered), and what they see as the attributes which go to make up adequate and inadequate support services.

7.4.2 How Users Perceive the Service They Receive

This section discusses how users perceive the IT support services which they receive. Consequently, this section draws on questions 8 and 9, the ranking questions, and 10 through to 18, the Likert scale questions. These questions form parts 2 and 3 of the questionnaire and represent the IT specific questions relating to service delivery.

Questions 8 and 9 - The Ranking Questions

In order to analyse the responses to these questions it is first necessary to attach a score to each response. This is done by awarding a score of "1" if a statement is ranked first, through to "4" if a statement is ranked last. These scores are then totalled to illustrate a representative ranking for all the users who responded. The figures are presented in table 7.1, overleaf.

What is immediately apparent is that, when asked to rank the statements, users place most emphasis on groups B, reliability and competence, and C, responsiveness and access. The tangible aspects of the service (group A) are ranked last for both questions.

Category	**Questions**		**Totals**			**Averages**		**Ranking**		
	Q8	Q9	Q8	Q9	total	ave	+/-	Q8	Q9	total
A: Tangibles	8.1	9.3	116	126	**242**	180	+62	4th	4th	**4th**
B: Reliability & Competence	8.2	9.2	58	77	**135**	180	-45	1st	2nd	**2nd**
C: Responsiveness & Access	8.3	9.4	65	56	**121**	180	-59	2nd	1st	**1st**
D: Empathy, Understanding & Communication	8.4	9.1	110	91	**201**	180	+21	3rd	3rd	**3rd**

Table 7.1 - Aggregate Scores for the Ranking Questions

Questions 10 to 18 - The Likert Scales.

Questions 10 to 18 were coded by recording the number circled on the Likert scale by each individual respondent. These are then totalled, for each question, to produce a grand total figure for all respondents. The questions are related back to the categories A to D, described previously. A lower score is favourable as it represents a stronger agreement with the statements.

	Questions	Total Scores	Grand Total	Average	Ranking
A	10 & 16	168 & 84	252	126	**4th**
B	12 & 13	120 & 112	232	116	**3rd**
C	14, 15 & 18	67, 89 & 74	230	77	**1st**
D	11 & 17	75 & 91*	166	83	**2nd**

Table 7.2 - Aggregate Scores for the Likert Scale Questions

As with the ranking questions, users most strongly agree with the statements for group C, responsiveness and access, and most strongly disagree with group A, the tangibles. However, unlike with questions 8 and 9, users place much greater importance on the statements which correspond to group D, empathy, communication and understanding.

7.4.3 Service Requirements from a User Perspective

The responses to question 5c, "What services do you require from the IT support function for each particular application?", when taken in their entirety, can be grouped into the following sets of support activities:

Technical Backup:

This involves the maintenance of facilities as both cure and prevention. This includes installing and configuring hardware and software, keeping the system working reliably, and providing immediate assistance when faults develop or problems are reported.

* this value represents the inverted score for question 17. This is done so that the negatively phrased question can be compared with the positive ones.

Troubleshooting :

This is defined as problem solving and assistance 'on request'. This is characterised by statements like, *"assistance when problems arise using spreadsheets".*

User Task Problem Solving:

What makes this different from mere troubleshooting is that it specifically involves applying IT to a particular user task or business need. This is characterised by responses like, *"Help applying package to my purpose"* or *"yes, to make the most of the package".*

Training and Education :

A large number of users stated that they required the IT support function to provide *"training"*, whilst more focused statements in this group included *"initial training"* and *"training when new packages are used"* . This user group have demonstrated a high recognition of the value and importance of training, expressed both in question 5c and throughout question 6.

No Service Required :

This category is comprised of users who stated that, for a particular package, they did not require the IT support function to provide them with any service. This is characterised by statements like *"minimal"* or *"not needed"*, and in one case help was sought elsewhere - *"I see the section assistant".*

	Support Activities	Number of Users	% of Total N° of Respondents
1	**Technical Backup**	22	69%
2	**Training**	20	63%
3	**Troubleshooting**	19	60%
4	**User Task Problem Solving**	13	41%
5	**No Service Required**	6	19%

Number of missing cases = 4

Table 7.3 -

Number of Users Requiring Particular Support Activities[1]

[1]Support activities are not mutually exclusive, as users may state that they require the computer support dept to provide several support activities.

As table 7.3 shows, users recognise the need for CSG (Computer Services Group) to guarantee that all technical systems run smoothly, adequate training is provided, and staff are available for troubleshooting activities. Of less concern to most users is the need for support staff to provide user task problem solving, however, this form of support is still requested by just over 40% of respondents.

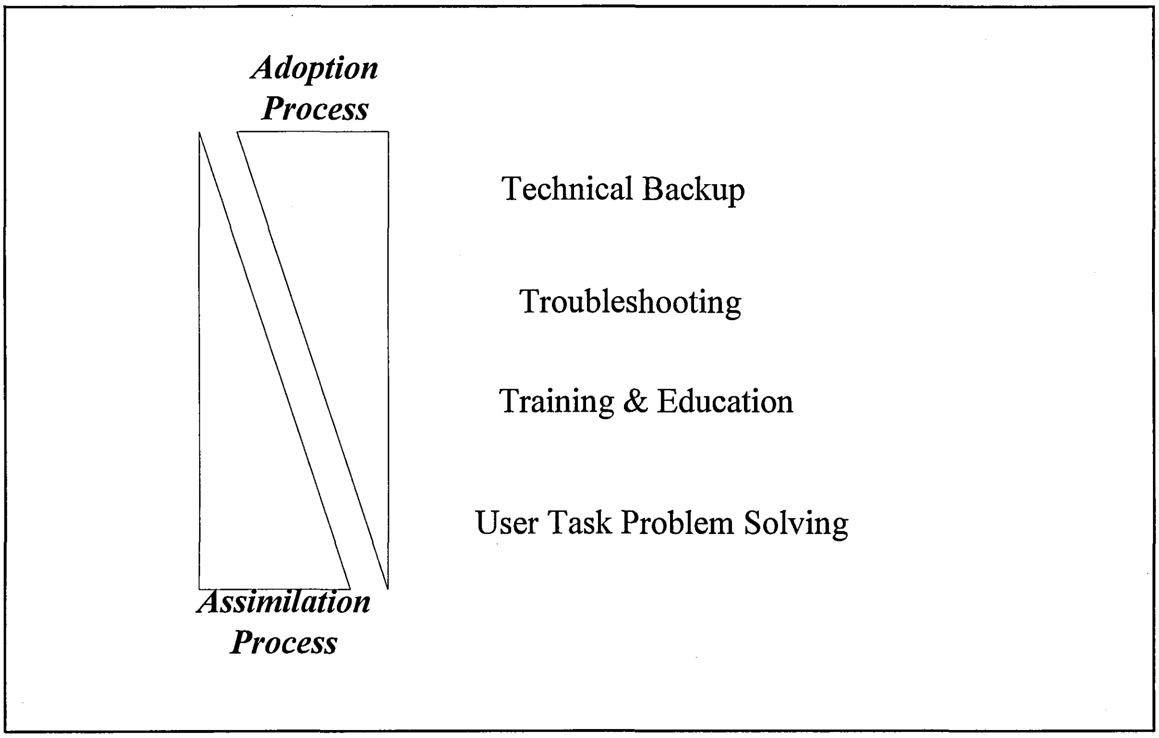


Figure 7.1 - Support Service Categories

It may be useful to view the support service categories using a conceptual framework to show the development from adoption to assimilation of IT, (see Figure 7.1). Within this framework providing technical backup can be seen as a practical or tangible element, and as such, can be considered part of the process of adoption. The troubleshooting and training elements may be seen as facilitating the move from a phase of adoption towards assimilation. Finally, user task problem solving may represent a phase of development where the user is keen to assimilate IT into their work roles.

7.4.4 Different Patterns of Usage and its Influence on Requirements.

Levels of Usage

Questions 1 and 2 provide an initial impression of the levels of computer usage amongst the respondents. Table 7.4 shows the percentage of the working day spent working with computers for each user.

Label	Number of Users	% of Total Users
Up to 34%	9	25%
35% to 65%	12	33%
66% and Above	15	42%
Total	36	100%

Table 7.4 -
Question One: Percentage of working day spent working with computers, as opposed to working on other tasks.

Table 7.5 shows the number of users who fall into each category of discretionary usage. Discretionary usage refers to the use of IT where an application has been specifically applied by the user to their own work.

Label	Number of Users	% of Total Users
Up to 34%	18	51%
35% to 65%	8	23%
66% and Above	9	26%
Total	35	100%

Table 7.5
Question Two: Level of Discretionary Usage

The scatter diagram (figure 7.2) shows the distribution of users in terms of their total usage and their discretionary usage[2]. The diagram has been divided into three distinct clusters of users. These are :

i) Low Usage, Low Discretion

This group incorporates users who spend less than 50% of their time working with computers and less than 50% of usage is discretionary.

ii) High Usage, Low Discretion

This group includes respondents who have high levels of usage, but no discretionary usage. Typically, this embodies secretarial support staff. The specific nature of their work merits this separate cluster.

iii) High Usage, High Discretion

This cluster refers to staff who have a high level of usage and much of the time they spend on computers is of a discretionary nature.

[2]Discretionary Usage refers to any application of IT where the user has a free hand in applying the technology to their work.

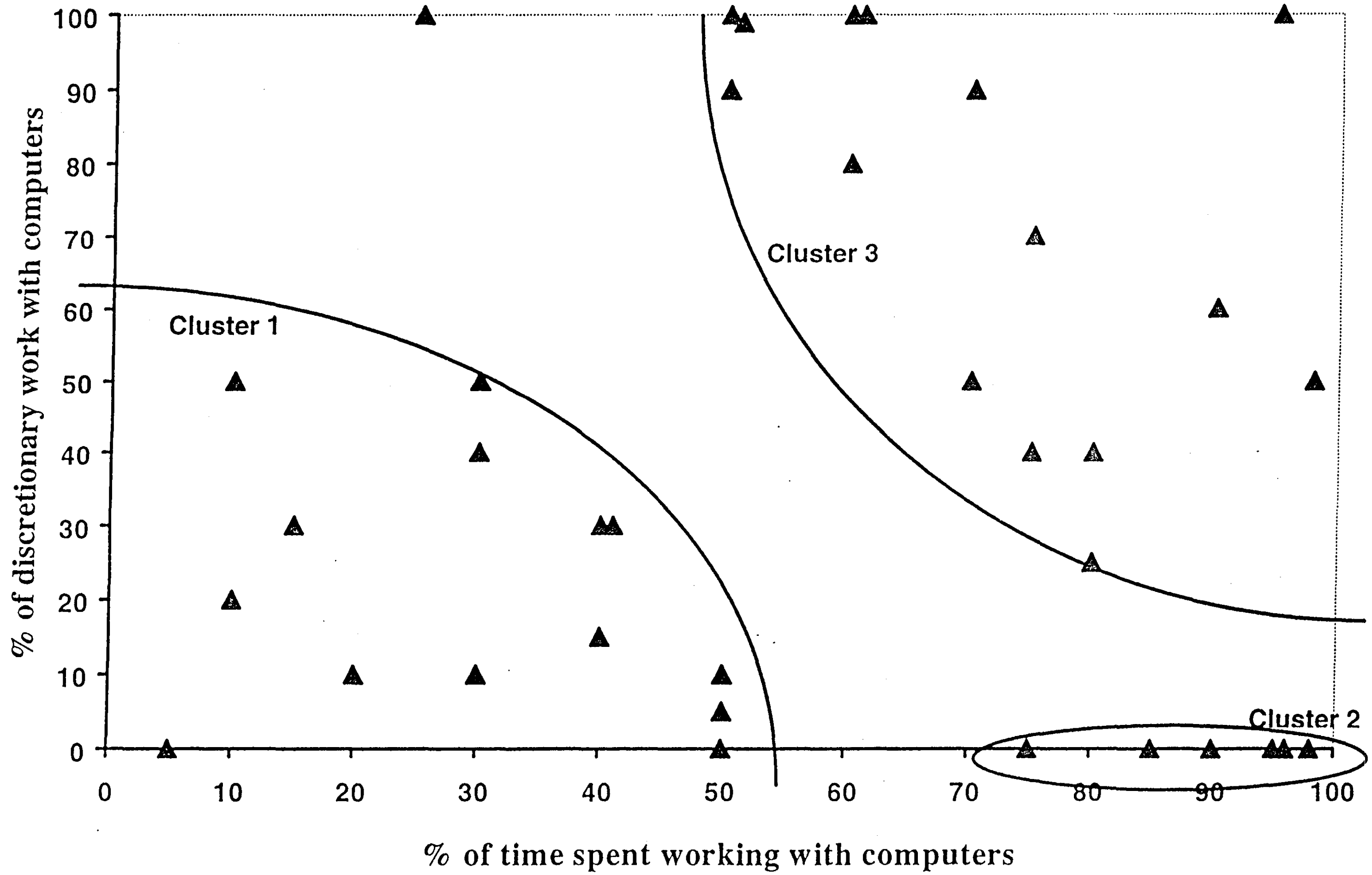


Figure 7.2 - Scatter Diagram of Total & Discretionary Usage.

The scatter diagram (figure 7.2), and the clusters described above, suggest that as the level of general usage increases the user feels more able to apply IT to their work. The reasons for this need further investigation, however, certain aspects can be identified. Users develop greater confidence and understanding of the technology through use and training. As a consequence they feel more empowered to find or adapt their own uses for IT. This is reinforced in table 7.6, where each cluster is crosstabulated against responses to question 3 - level of expertise.

	Towards Novice	**Average Skills**	**Towards Expert**	**Row Total**
Cluster 1	4	5	5	14
Cluster 2	3	1	2	6
Cluster 3	1	3	12	16
Column Total	8	9	19	36

Table 7.6

Table 7.7 shows the total amount of time spent working on discretionary applications in an average day, for each individual user. this represents how much of a user's total time is devoted to discretionary activities.

Label	Number of Users	% of Total Users
Up to 10%	16	44%
11% to 30%	6	17%
31% and Above	14	39%
Total	36	100%

Table 7.7 -
The percentage of the working day spent working with "Personal Task Systems", i.e. applications whose use is at your discretion.

Question 5 (parts a and b) compare the different types of package used by respondents and the specific purposes for which they are applied. In particular, part b uncovers the business or work related tasks for each particular application of IT. Figure 7.3 shows the number of generic types of package employed by each respondent.

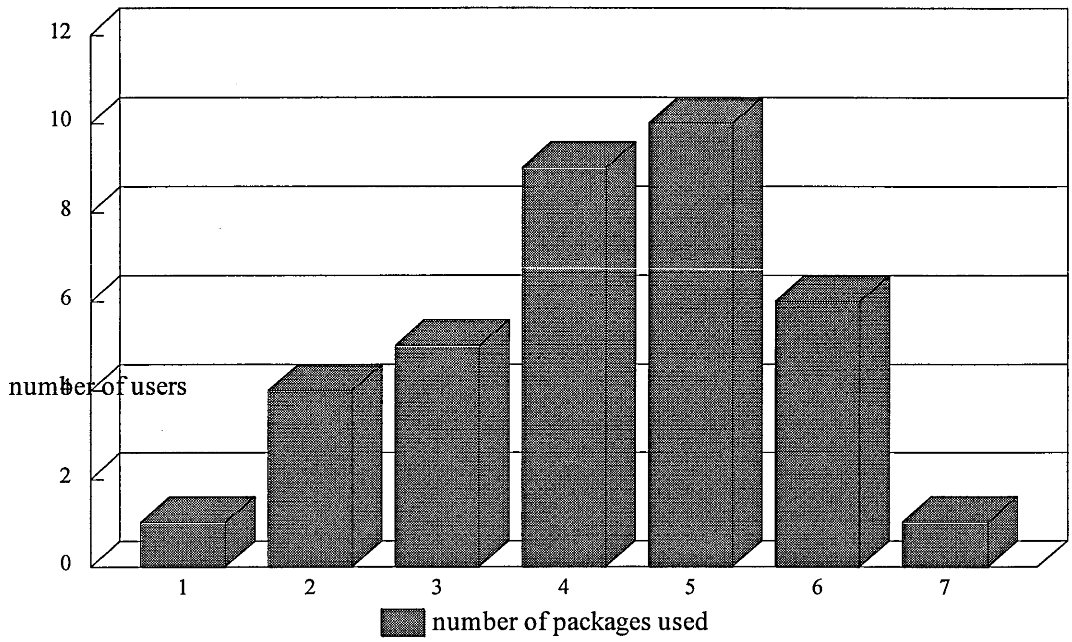


Figure 7.3 - Diversity of Software Usage

Users express their use of software packages by focusing on two themes. A general theme incorporates the basic administration elements of their work (for example, word processing of reports, memos etc.) and a specialised theme addresses specific, refined work tasks (for example, a package for structural analysis of engineering designs). The general theme is common to all users, whilst the specialised theme relates to applications which are needed by individual or small groups of users. Consequently, users require that the nature of support services moves from a general, multi-user focus, to a specific, individual user focus. The change in service requirement is dependant on the user needs, rather than the technical characteristics.

Levels of Understanding

Questions three and four asked users to assess their own understanding of IT. Table 7.8 summarises the users self-perception of their own level of understanding, whilst Table 7.9 builds on this by getting users to relate their perceived level of understanding to its applicability to their work.

Category	Likert Scale Responses	Number of Users	% of Total Number of Users
Towards Novice	1, 2 and 3	8	22%
Average Skills	4	9	25%
Towards Expert	5, 6 and 7	19	53%
Total		36	100%

Table 7.8 -
Question Three: Which of the following best describes your level of IT understanding?

Category	Likert Scale Responses	Number of Users	Valid % of Total Number of Users
Low Confidence	1, 2 and 3	5	14%
Average	4	4	12%
High Confidence	5, 6 and 7	26	74%
missing value	-	1	-
Total		36	100%

Table 7.9 -
Question Four - How confident are you with your understanding of IT in relationship to the computing tasks you have to undertake?

Effectively, the vast majority of users are confident that their level of understanding of IT is suitable for the work they undertake. However, there is not enough information to allow any analysis of how this might vary depending on the nature of the work users are expected to do.

7.4.5 User Perceptions of Adequate and Inadequate Service.

This section addresses the questions designed to obtain the users' conceptualisation of what they view as 'good service' and 'bad service' and subsequent levels of satisfaction with the service they receive. Accordingly, there is a strong reliance on question 6, the qualitative descriptions in the respondent's own words, and question 7, the Likert scale.

It is, perhaps, beneficial to address question 7 first, as this provides an initial indication as to whether this group of users feel satisfied with the service they receive. From table 7.10, it is evident that the general trend is towards the view that the support services provided are responsive to needs. However, it should be noted that 28% of respondents gave answers below the midpoint value of the Likert scale.

	highly responsive					insufficiently responsive
Response	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Frequency	2	6	12	6	8	2	0
Percent	6%	17%	33%	17%	22%	6%	0%

Table 7.10 -
Question Seven -In general, do you believe the IT support services you receive are responsive to your needs?

For question 6 a set of eight diagrams have been generated. Each diagram presents clusters of 'like' statements. The diagrams are structured so that they correspond with the four sets of statements discussed in section 7.3, namely:

-A- Tangibles,
-B- Reliability and Competence,
-C- Responsiveness and Access,
-D- Empathy, Understanding and Communication.

In addition, the statement clusters are further structured depending on whether they are positive or negative, i.e., what services are adequate or inadequate, respectively. The statements in each diagram are followed by an identity number which refers to the original respondent (e.g. [09]).

The Tangible Element of the Service

Figure 7.4 suggests that users clearly value the organisational investment in computing resources. The quality of the tangible IT elements and the commitment to maintaining that quality are also supported by the respondents' statements. In addition, the relative scope given to users in selecting software is also valued.

By contrast, the users perceive support services to be inadequate when the reliability of the hardware and computer network is called into question (see figure 7.5). Furthermore, there is limited recognition that changes in the technology component of IT services create problems for the users in their working environment. Each change, particularly software changes, has to be assimilated by users who may view this as a distraction from their main work activities.

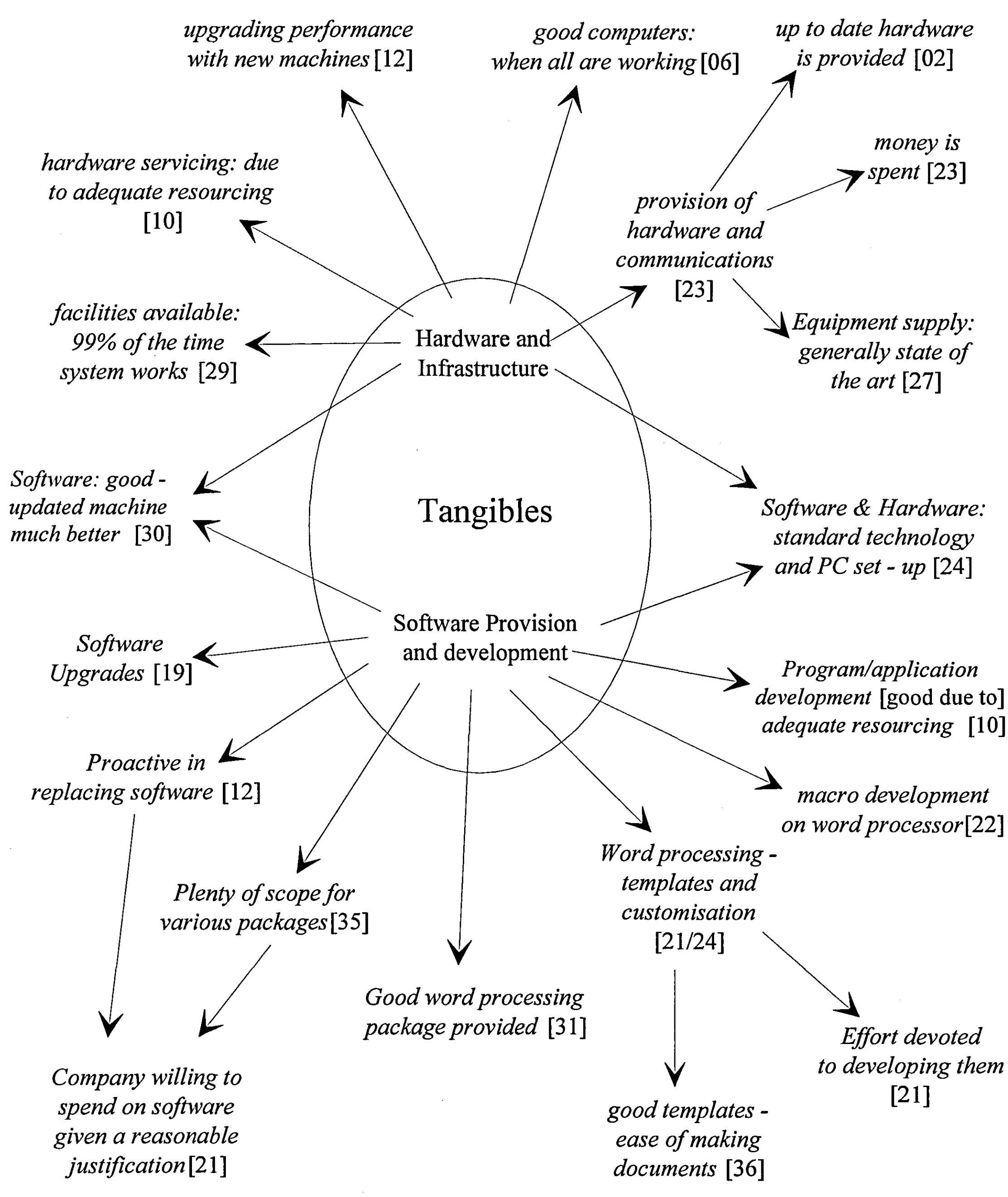


Figure 7.4 - Tangible Service: Adequate Elements

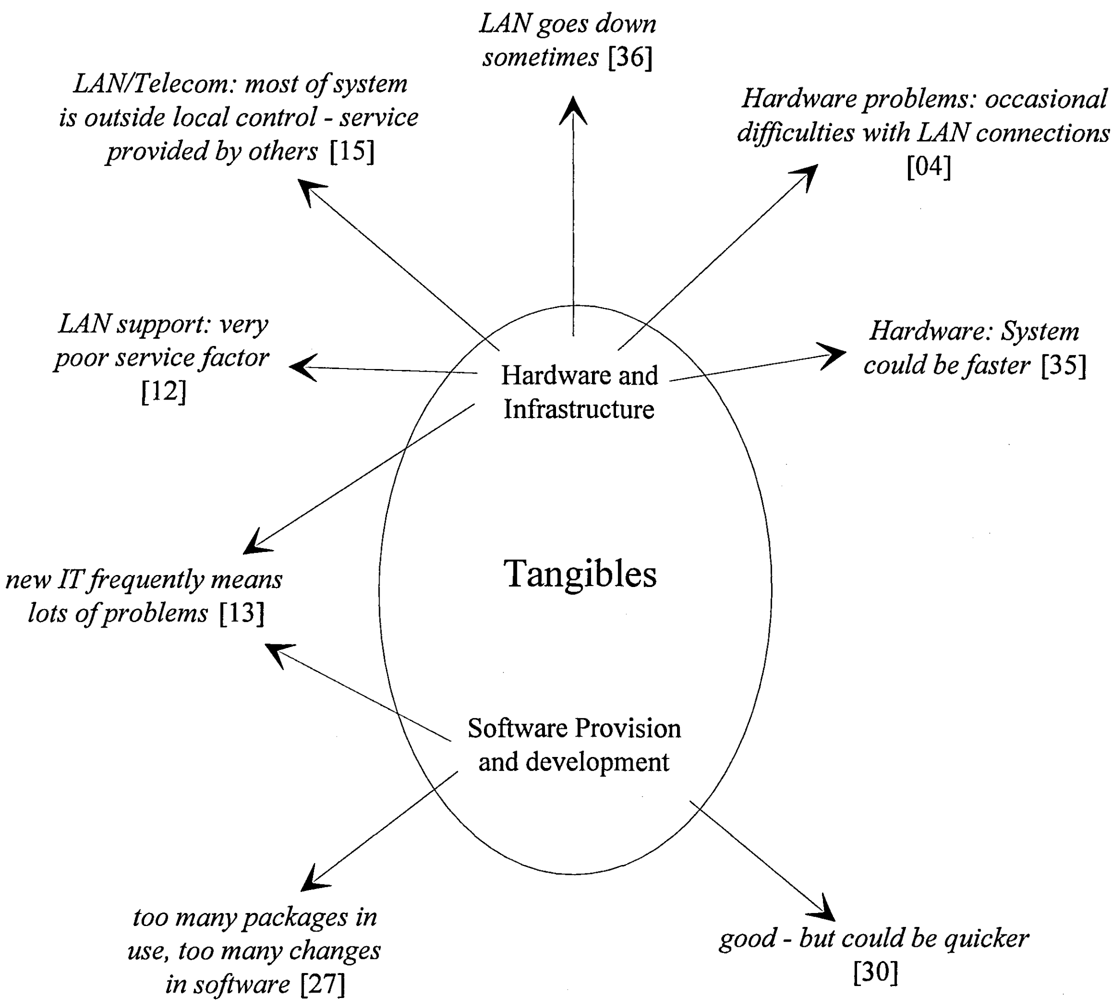


Figure 7.5 - Tangible Service: Inadequate Elements

The numbers of users who found the tangible element to be satisfactory (figure 7.4) outweighs the numbers who perceive it to be inadequate (figure 7.5). This suggests that as long as the technology is of a reasonable, operational level the users are generally satisfied. There is no evidence to suggest that the main body of users place an over emphasis on the technology component. Whilst users recognise the quality of the technology made available to them, they are not driven by the need to keep up with the latest developments, and show no fears of falling behind technically to other users or other organisations.

Reliability and Competence Elements

These service elements focus on the ability of IT support personnel to provide a dependable, consistent and competent support service. Accordingly, the statements mapped onto figures 7.6 and 7.7 highlight user perceptions as to whether support staff

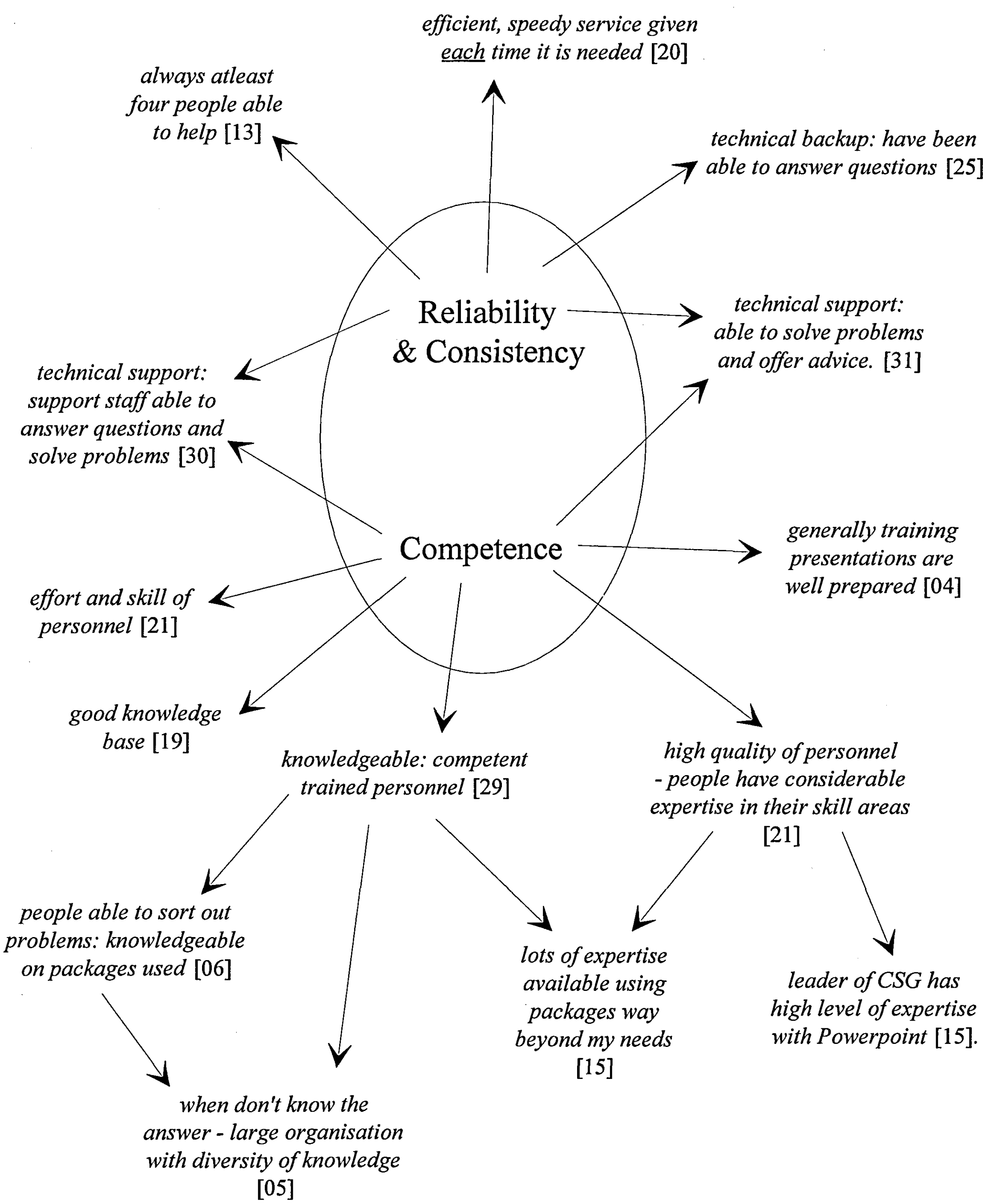


Figure 7.6 - Reliability and Competence: Adequate Elements

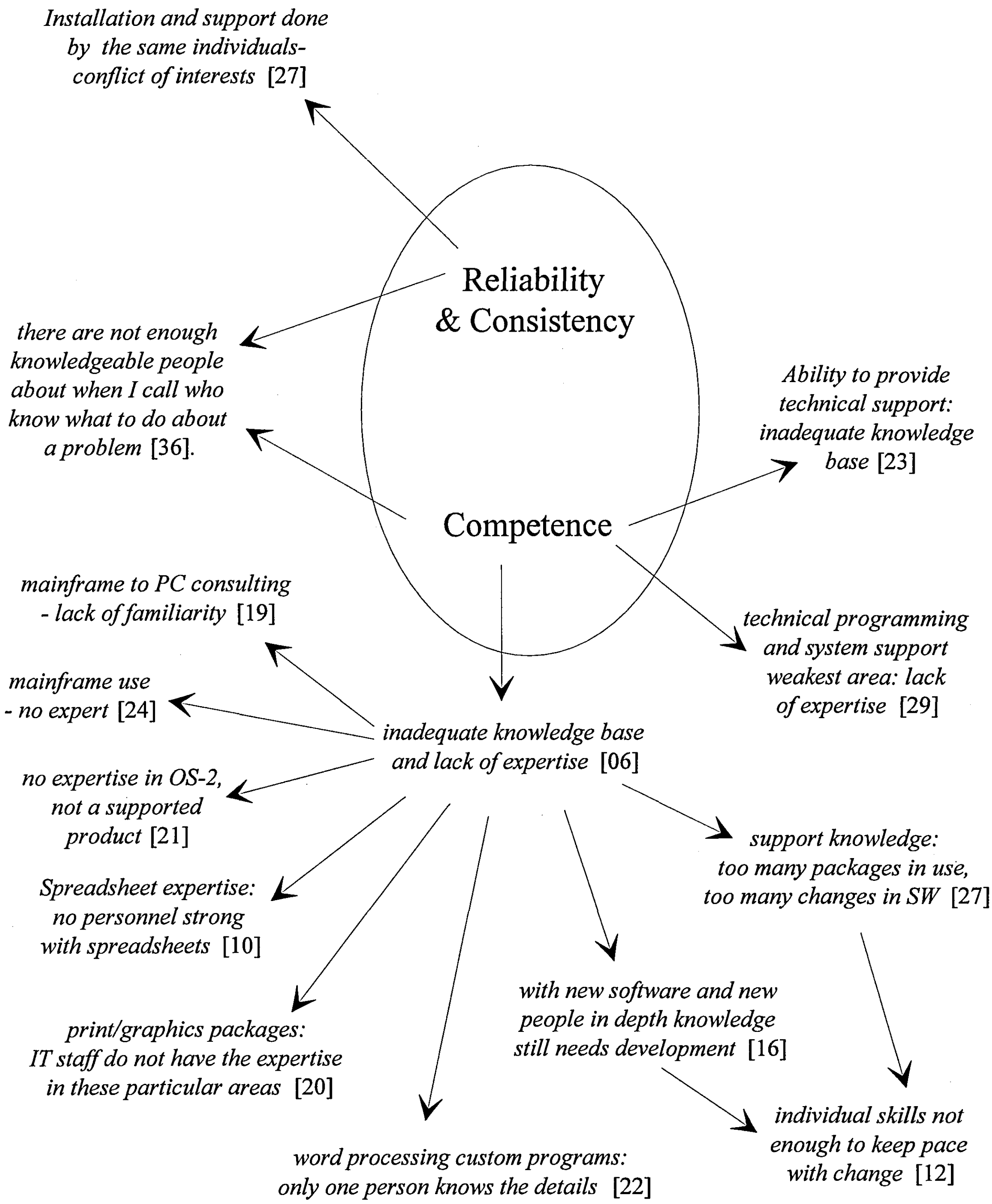


Figure 7.7 - Reliability and Competence: Inadequate Elements

have the required knowledge to provide a good service and whether service performance is adequately consistent.

With just two exceptions, the support service provided is perceived by users to be dependable and consistent. The statements suggest that users see support staff as solving their IT related problems satisfactorily and consistently. By contrast, users seem divided over the competence of the support staff. A number of statements stress the knowledgeability and expertise of support personnel. However, a comparable number of statements refer to an inadequate knowledge base and lack of expertise. Users' perceptions of competence seem to differ depending on the particular service they require. The statements suggest that as users require more specialised skills, for example, an in-depth familiarity with particular software, their perception of support staff competence moves from being generally adequate to specifically inadequate.

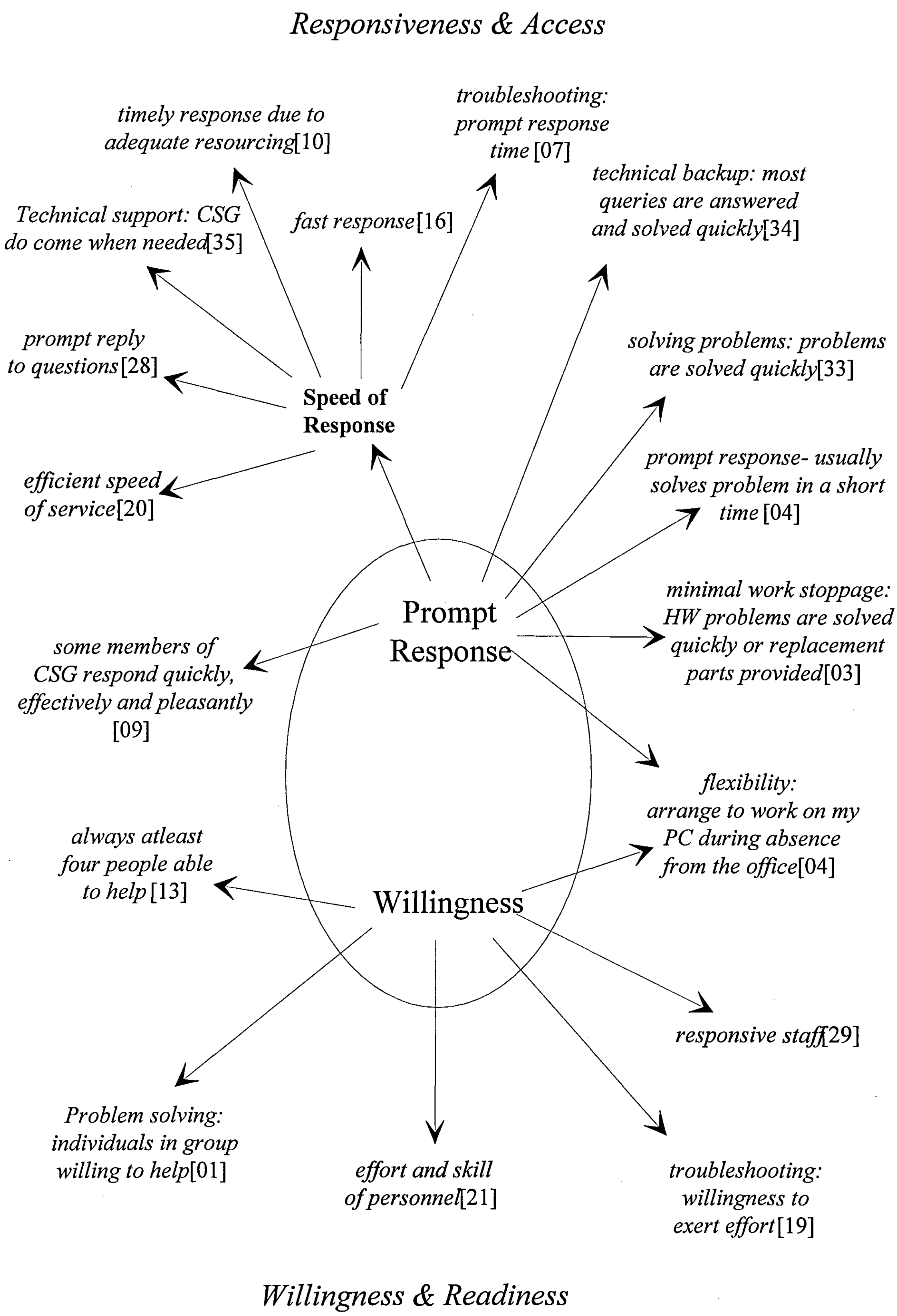
Another important observation may be made from comparison of figures 7.6 and 7.7. It would appear that users place a far greater emphasis on the expertise and competence of the people providing the service than they do on the reliability and consistency of the support service.

Responsiveness and Access Elements

Responsiveness is concerned with the users' perceptions of the willingness of support personnel to provide a service, and the ease with which support personnel may be contacted. Figures 7.8 and 7.9 map out the statements which fall into this category.

With only one exception, users highlight the willingness and readiness of IT support personnel. This is typically characterised through descriptions of the IT staff as flexible, responsive and willing to help.

Despite the apparent willingness of the IT support staff, users perceive access to support services as rather more problematic. Whilst many users believe that the support department provides a prompt and speedy response to support requests, this is matched by a number of statements which show displeasure with response times. This displeasure is expressed as either statements concerning the slow speed of response, or the inability to make contact with the support group. The statements only allow for a limited exploration of the possible reasons why this difference exists. It is feasible that certain users only require support services at critical times, for example a network



<u>Figure 7.8 - Responsiveness and Access: Adequate Elements</u>

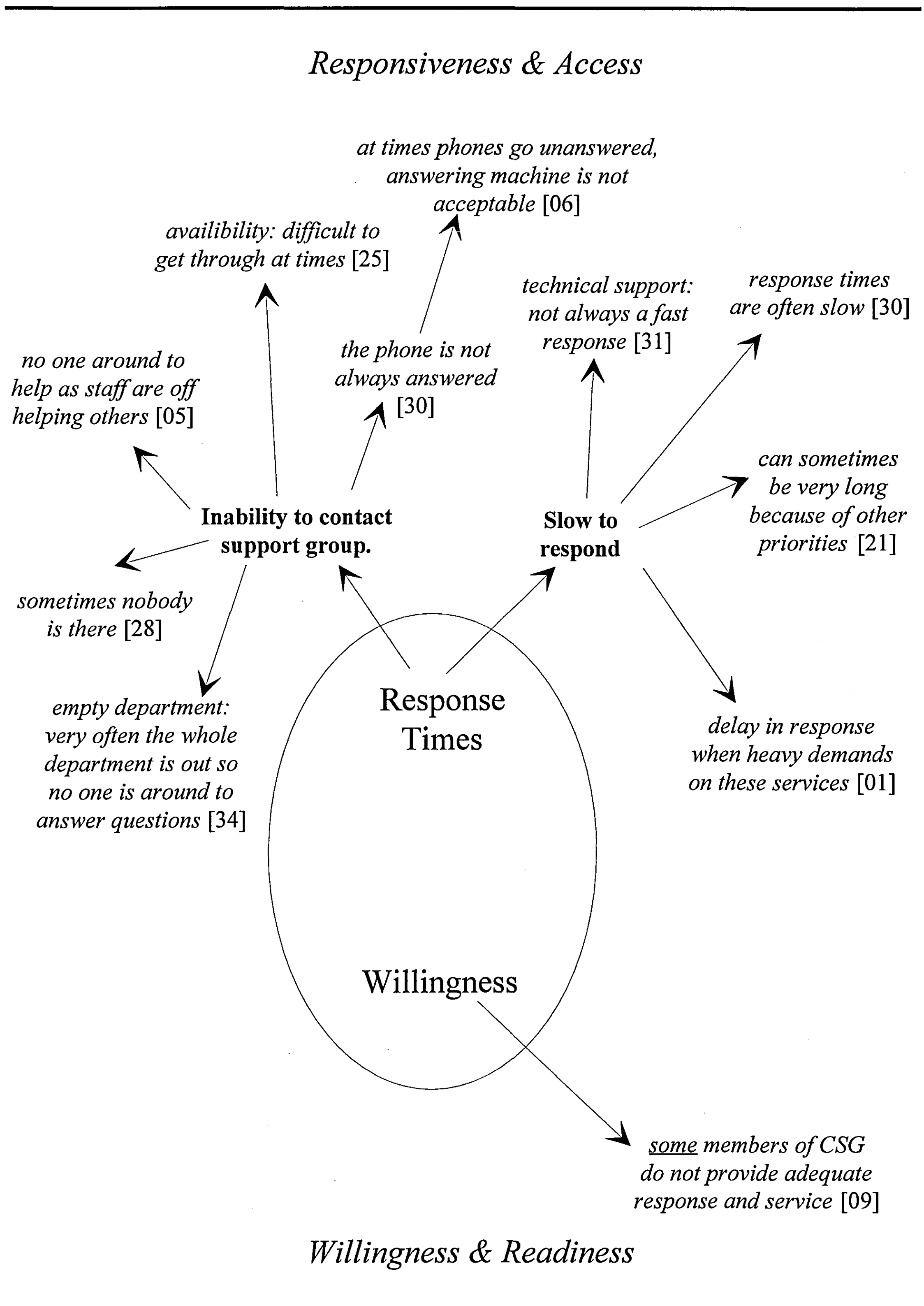


Figure 7.9 - Responsiveness and Access: Inadequate Elements

failure which would effect the majority of users. Accordingly, they may judge the response at times when demand is at its highest and support staff are most under pressure. Several user statements relate a slow response to heavy demands on support services and competing demands on support staff time. Equally, it is possible that users may have different individual perceptions of what is a prompt service and what is not.

The plethora of statements concerned with access and response times are an indicator of the importance which users attach to these areas of service. By contrast, it would seem that far fewer users focus on the willingness of IT support staff.

Elements of Empathy, Understanding and Communication

These elements focus on the human skills embodied in the service interaction between users and IT professionals. Accordingly, the personal characteristics of contact personnel are of particular concern. These elements are especially interested in the service provider's understanding of user needs and the ability to communicate effectively with users. User statements concerning these elements are shown in figures 7.10 and 7.11 (for adequate and inadequate services, respectively).

Figure 7.10 details the positive statements which users made. What is immediately apparent is the limited number of statements users make. This may represent a lack of concern or consideration with this area of service delivery. Equally, it may reflect the inability of users to see this area of service in a positive light, with regard to the service they actually receive. However, from the statements provided it is possible to explore empathy, understanding and communication. Users would appear to value the individual attention and specific personal interaction with support staff. In addition, some users value the friendly approach of staff during the service encounter.

Figure 7.11 suggests that users are more keen to describe the inadequate elements of this area of the service they receive. The variety of statements highlight a number of areas of interest. Some users believe that IT staff consider their service complete when the technology is in place. In addition, some users find the language IT personnel use creates an unnecessary barrier.

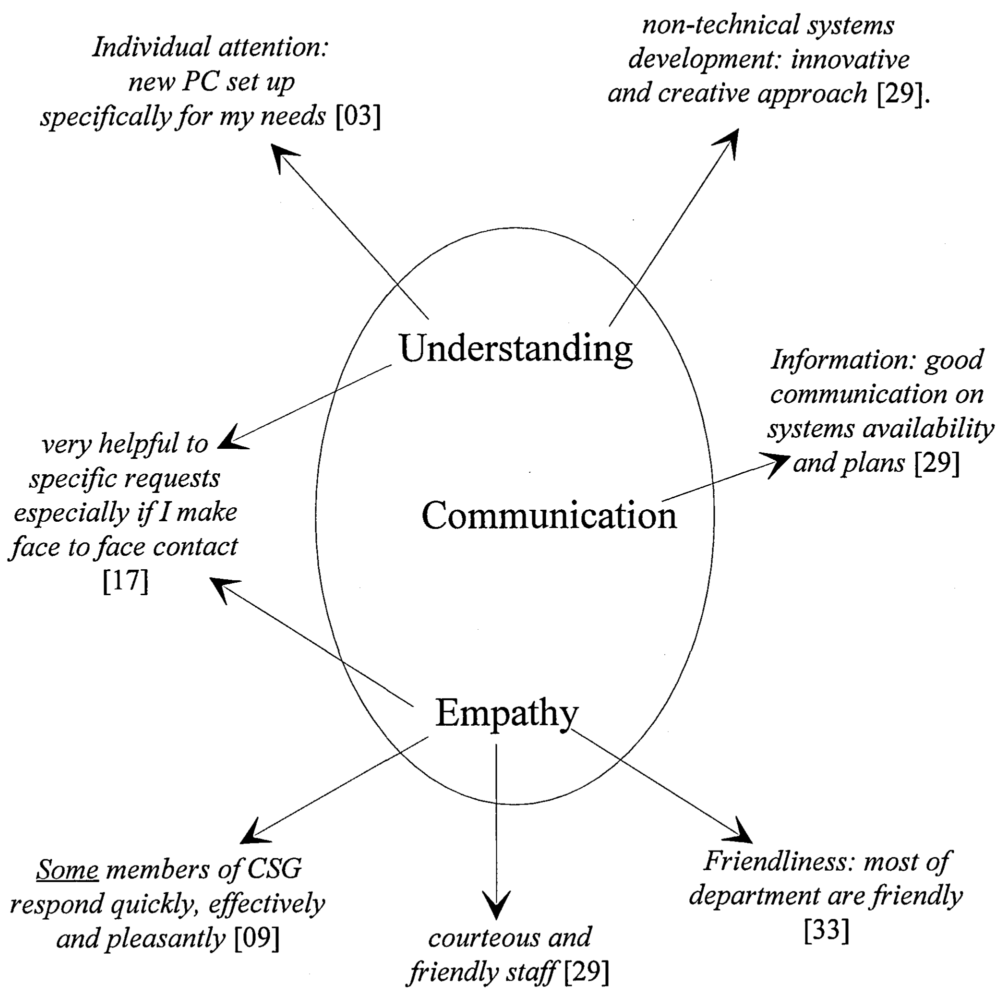


Figure 7.10 - Empathy, Understanding and Communication: Adequate Elements

Furthermore, it is suggested that the IT support service shows a poor understanding of user needs or the nature of their work. Also, there is a failure on the part of IT personnel to identify with the different needs of users. Several statements imply that the approach taken by IT support staff favours a technical perspective. The IT function is perceived as imposing specific technologies on users or dictating technology selection without consideration of the situation of individual users. One user suggests that IT staff assume that all users understand the technology regardless of their backgrounds and experiences.

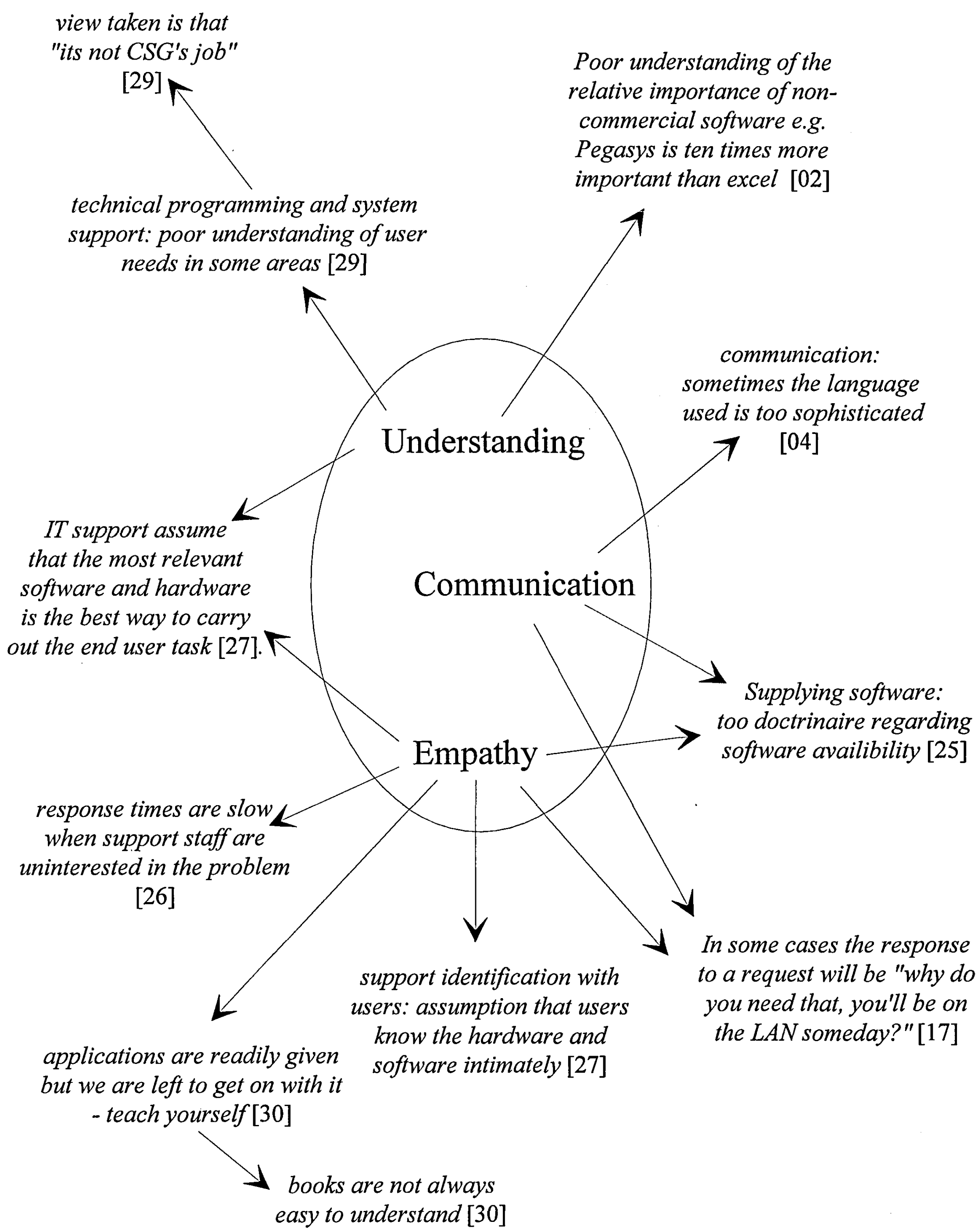


Figure 7.11 - Empathy, Understanding and Communication: Inadequate Elements

7.4.6 Comparative Analysis of User Perceptions of General Service Quality and Specific Services Received.

This section aims to augment the service aspects which users perceive as adequate or inadequate (section 7.4.5) by re-appraising them in the light of users' more general perceptions of what comprises a quality service (section 7.4.2).

The importance which users attach to specific aspects of service delivery generally, would appear to be supported by the numbers of statements which refer to the particular service they receive. In the main, section 7.4.2 found that users place a far greater importance on responsiveness and access (group C) and reliability and competence (group B), than they do on the tangible, technology component of service (group A). For the most part, this is borne out in figures 7.4 to 7.11. When users are asked to consider the service they actually receive these aspects (groups B and C) emerge as central considerations. However, it is important to note that the adequate elements of the tangibles (group A) also features strongly.

The combination of findings from sections 7.4.2 and 7.4.5 suggest that it is possible to identify a range of issues which are perceived by the users to be critical to support service success. These are:

i) *Speed of Response* : Crucial to whether users perceive the service they receive as adequate or inadequate is the speed with which support staff respond to their requests for assistance. Users value a prompt response and efficient speed of service. Logically, users perceive a slow response as inadequate, despite recognition of the reasons why response may be slow. In addition, users do not like being unable to gain access to support staff.

ii) *Competence* : A further critical area is competence. Users perceive the knowledge and expertise of support staff as important attributes. The value which users place on competence is reinforced by their concern when support staff do not have the skills to solve their problems.

iii) *Adequate Technical Resources* : In addition to the response speed and competence components, users seem to perceive a minimum level of resources as important for providing an adequate service. However, once this minimum level has been satisfied other issues become more dominant.

7.5 Conclusions

Section 7.4.2 presented the results from the service delivery instrument from parts two and three of the questionnaire. What is apparent from these results (see table 7.1) is that, when asked to rank statements, users place most emphasis on groups B, reliability and competence, and C, responsiveness and access. Furthermore, the majority of users chose to rank the tangible aspects (group A) of the service as least important. Table 7.2 shows the aggregate scores for questions 10 to 18 on the questionnaire. This supports the credence which users give to the service aspects of reliability and competence, but does not show a clear emphasis on responsiveness and access. Instead, users place much greater importance on the statements which correspond to group D, the human interaction skills of support staff (empathy, communication and understanding). Again, the tangible aspects are the least important attributes of service quality and delivery. What is clear from section 7.4.2 is that users do not perceive IT support services in terms of a single, technology focused perspective. It is apparent that a number of other considerations are perceived as being more important than the technology alone.

The questionnaire elicited user comments on the aspects of the service they actually receive. Of particular interest are the statements which describe the service aspects which are adequate or inadequate. The findings are presented in section 7.4.5. The strength and nature of the statements which users gave generally support and reinforce the conclusions of the service delivery instrument, mentioned in the previous paragraph. In addition, the wealth of statements allow for further exploration of the areas which users perceive to be critical to good service delivery and quality. The speed of response and the knowledge and skills of support staff emerge as primary user concerns, with the proviso that a reasonable level of technical resources is maintained. This demonstrates that users do not perceive their IT environment from a technology perspective. Instead, a picture of users emerges which shows how they consider several perspectives when assessing IT support services.

The survey highlighted a variety of different user types and characteristics. Marked differences in levels of computer usage and the nature of that usage, were uncovered. This is reinforced by the users' perceptions of their own computing knowledge and abilities (see table 7.6). For the petro-chemicals company, three distinct user clusters are identified, relating to differing usage patterns. Table 7.3 illustrates the variety of service requirements. The findings suggest that the demand for each service type relates to the stage of adoption and assimilation which a particular user has reached. Despite the various users characteristics, described above, the uniformity of responses suggest that perceptions of service quality show a homogeneity for all users, regardless of organisational background and IT experience.

A further conclusion from this chapter concerns the follow-on interviews, described in chapter nine. This questionnaire uncovered several user characteristics, which are outlined above. Whilst, these characteristics appear not to alter the perceptions which users employ when considering service quality, it is feasible that different characteristics will influence the users' perceptions of the IT adoption and assimilation process.

7.6 Summary

This chapter represents the first study of the receipt of IT services, discussed in Chapter 3. It focuses on the assessment of how a group of users perceive the IT support service which they receive from their organisational IT function. In addition, it explores how user perceptions influence their assessment of the quality of the services they actually receive.

The study was conducted by means of a semi-structured questionnaire (see section 7.3 and Appendix F). This questionnaire made particular use of an adaptation of a research instrument, SERVQUAL, designed to measure service delivery and quality. The background to the instrument is described in section 3.5.2. The questionnaire was implemented inside two organisations; a petro-chemicals company (section 7.4) and a financial services company (Appendix G).

Section 7.4 discusses the findings and details the user perceptions of service quality. In addition, it analyses the varying nature of the services users require and explores some of the different characteristics of the users who were questioned. Finally, the conclusions (section 7.5) draw together all the findings and discuss areas of interest to be examined through the use of a set of follow up interviews in Chapter 8.

CHAPTER EIGHT

Exploring User Perceptions of IT Adoption and Assimilation

8.1 Introduction

The purpose of this chapter is to explore further the IT professional - user relationship from the perspective of the IT service receivers. The aims of the research in this chapter are twofold, namely to address and build on the findings from the service delivery questionnaire (see chapter 7) and to provide a clearer understanding of the cultural context and organisational environment in which the adoption and assimilation of information technology takes place. Both of these aims attempt to further our understanding of the adoption and assimilation process which lies at the heart of this thesis. Essentially, the aim of chapter seven was to provide a breadth of understanding, whilst this chapter is designed to generate a depth of understanding. The most suitable vehicle for achieving these aims is to employ some form of follow-on interview (see section 8.2).

8.2 Design and Method

This section briefly discusses the choice of interview technique to satisfy the requirements of this phase of the study. This is followed by a description of the development of a set of suitable interview questions based on issues raised in the introduction (section 8.1). Finally, the criteria for the selection of suitable interviewees are discussed.

8.2.1 Interview Technique

As previously stated the purpose of this phase was to build on the service delivery questionnaire and to further the understanding of the culture and organisational context. This required that interviewees be allowed as much freedom to give answers as they needed, whilst steering these answers so that they addressed the salient issues. Neither the two extremes of structured or unstructured interviews satisfied these requirements. Consequently, the most suitable approach was a semi-structured interview technique, in particular the standardised open-ended interview. As Stone (1984) states:

> *"This* [standardised open-ended interview] *approach is a useful one when the questions which need to be asked can be formulated in advance but when greater flexibility of response is required"*

At this point, it is possibly worth noting some of the pros and cons of applying this approach so that they can be borne in mind when considering the following Analysis and Results section. Further discussion on the merits and pitfalls of interviewing techniques can be found in Stone & Harris (1984), Burgess (1984), Stone (1984), Douglas (1985) and Foddy (1993).

The development of a set of interview questions provided a loose framework which allowed the interviewees enough scope to answer in their own words and based on their own experiences and perceptions. The questions were used to guide the discussion and to keep the conversation within the relevant bounds of interest. The interviewees were encouraged to see the interview process very much as a conversation. An added advantage of the question framework was that it imposed a rough time control of between 25 and 35 minutes per interviewee. Furthermore, the interviewer was able to explore interesting ideas and topics, which the interviewee raised, through the use of further questioning. Once a particular avenue or topic had been fully discussed the interviewer was able to return to the initial question framework.

The option of tape recording interviews was unacceptable to the host organisation so responses to questions were recorded by writing down the answers given word for word. Whilst this procedure proved laborious, it did build up a trust with the interviewee, who was able to see what was written, and it allowed for the clarification of potentially misleading points. Furthermore, it was possible for the interviewer to draw attention to previous answers the respondent gave and to cross reference these with the responses of other interviewees. None of this would have been possible if the conversations had been taped.

The analysis of standardised open-ended interviews is assisted by the fact that responses are given to the same set of questions. This means that the comparability of responses is increased. However, this benefit is offset by the fact that open-ended responses are generally more difficult to analyse than structured ones (Stone, 1984).

8.2.2 Question Development

The introduction to this chapter highlighted the importance of understanding the adoption and assimilation processes in order to understand better the propositions. Consequently, a set of eight questions was developed to guide the conversations with users, as previously mentioned. The phrasing of specific questions aimed to channel each interviewee's thinking towards the issues of concern. Questions were developed and piloted using a loose framework which addressed the *adoption process*, *assimilation process* and *organisational context*. Because the various elements of this framework are inter-related (and as a consequence overlap extensively), the resulting questions are not intended to focus explicitly on any one element but, rather, to take the interviewee through the entire process of IT innovation from its origins towards the point of full acceptance.

At the beginning of each interview a brief introduction was given, which spelt out the purpose and direction that the conversation would take. The introductory phase also gave both interviewer and interviewee an opportunity to clarify any points which required further explanation. The basic text of the introduction was as follows:

> I am trying to identify <u>what Factors</u> and <u>Processes</u> lead up to the successful adoption and assimilation of IT within EEEL.
>
> I am interested in the whole process from the <u>initial identification</u> of the idea for the introduction right up to the <u>successful implementation</u>.
>
> I am interested in <u>your perception</u> of how it is here - what are the strong points and what are the weak ones.

The relatively high level nature of the questions was to allow scope for conversation with the minimum of intervention from the interviewer. The final question framework was as follows:

The Process of Adoption

1. What helps or hinders the adoption of information technology within EEEL ?
2. Thinking about the adoption of IT, where do new ideas usually originate?
3. Are users (and CSG staff) satisfied or dissatisfied with the process of adoption of IT?

The Process of Assimilation

4. Do you believe you are using computers to the best of your ability?
5. What are the major factors that constrain your use of computers ?
6. Do you believe there is sufficient availability of training ?

Organisational Context

7. What do you think typifies the culture of the organisation (EEEL) ?
8. What aspects of the culture at EEEL encourage or discourage effective use of computing ?

8.2.3 Interviewee Selection

It was necessary for a number of descriptive attributes to be recorded to allow for cross-reference with the qualitative responses. This influenced the selection of interviewees so that they represented a suitable organisational mix.

The key descriptive attributes included :

Position in the Organisational Hierarchy

Description	**Interviewee Identification**
Senior and Middle Management	B, D, F, G, H
Lower Management & Secretarial Staff	A, C, E, I

Section

Description	**Interviewee Identification**
1 Support	A, C
2 Process	B, G
3 Plant	D, F
4 Design	E, H, I

<u>*Level of Usage*</u>

Description	Interviewee Identification
High Usage, High Discretion (Cluster 3)	B, D, E, F
Low Usage, Low Discretion (Cluster 1)	C, G, H, I
High Usage, Low Discretion (secretarial) (Cluster 2)	A

This corresponded to the categories described in Chapter 7.

8.2.4 The Mapping Process

This section describes how a form of cognitive mapping was employed to analyse and present the rich, qualitative data provided by the interviewees. It is important to note that an elementary version of cognitive mapping was used in this research activity, rather than the more stringent approach suggested by some authors (Ackerman et al., 1990, 1991).

The mapping process comprised several distinct phases. It may be advisable to refer to section 3.5.3 for the full background and practice of the mapping technique.

Phase one required that a complete transcript of each interview be produced. This formed the raw material out of which the maps will be created. The transcripts record each interview word for word so as to preserve the interviewee's intended meaning and connections between thoughts. The interviewing technique and its practical constraints have already been described (section 8.2.1).

Phase two addressed the construction of the maps. Maps were produced for a) each individual interviewee and b) as aggregate maps to ascertain how the group of interviewees perceived each issue raised by specific questions.

To produce individual maps each transcript was analysed so that sentences were separated into distinct phrases. The relevant connections were made between phrases as originally stated by the interviewee. The phrases and their connections were then related to the loose conceptual framework portrayed in figure 8.1, below. The reasoning for this is that it steers the maps towards the issues addressed by the interview questions, whilst focusing the maps within the bounded problem area. An additional benefit was that it made the comparison of individual maps much easier, whilst retaining much of the 'free flowing' nature of more orthodox maps. It was possible for statements to fall within the boundary of a particular area (i.e. a chain of phrases may relate entirely to the adoption process) or cross boundaries (i.e. the phrases may relate to part of the adoption process and part of the assimilation process). Phrases could also be recorded independently of other phrases if the interviewee drew no other connection. It should be stressed that the connections shown in each map only represent connections made by the interviewee. Furthermore, none of the connections mentioned have been excluded.

A set of aggregate maps was produced. The raison d'être is to be found under the heading "Comparing Cognitive Maps" in section 3.5.3. The aggregate maps were realised by accumulating all the phrases made by all the interviewees to a particular question. For each question key themes emerged and it was possible to cluster together phrases which reinforced or contradicted the theme. This provided a set of maps which addressed certain sub-sections of the adoption and assimilation process and accessed the shared beliefs and incongruences between organisational members.

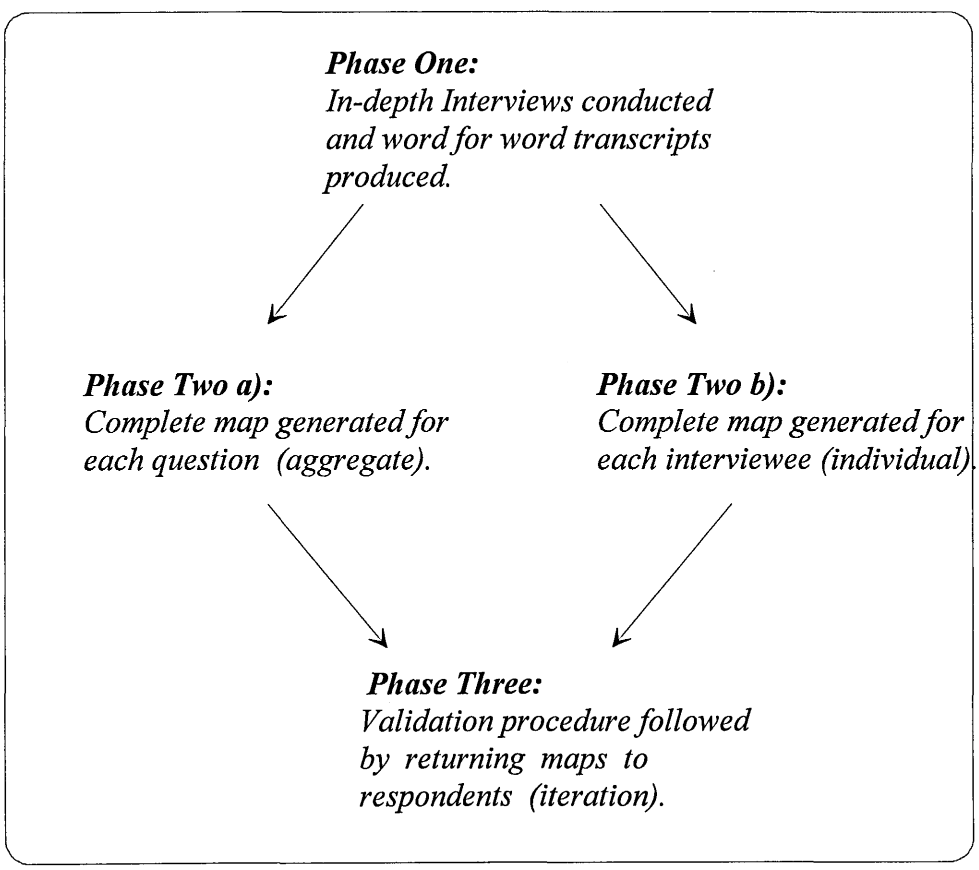


Figure 8.1 - Summary of the Mapping Process.

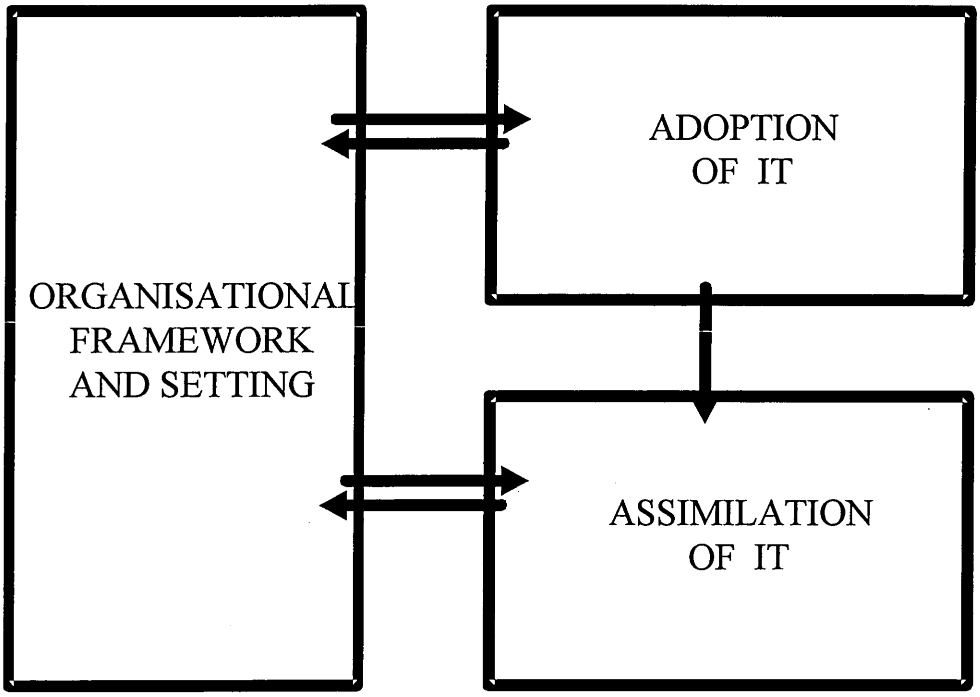
Phase three addressed the issue of validation. This is the process by which the maps were 'checked', and confirmation is sought that each map represents what was said in an acceptable way. Different approaches were taken depending on the type of map. Individual maps were returned to the relevant interviewee, whilst all aggregated maps were shown to two senior personnel; the IT support manager and a departmental section head with responsibility for all organisational support services and representing many users of IT support services. Feedback was invited from all those concerned to determine whether they agreed or disagreed with the map and/or to provoke any 'fine tuning' of elements of a map. All interviewees broadly agreed with their map. Three interviewees made constructive additions to their maps, whilst the others left the maps unchanged. However, two interviewees did not respond due to the nature of their work. Returning the map enabled the interviewees to reflect on what had been said in the original interview and provided the mapping process with a useful iterative phase.

8.3 Analysis and Results

8.3.1 Introduction to the Analysis

This section will make use of the conceptual model below. The diagram represents the model in its simplest form. This diagram will be revisited throughout this section as an aid to enlarge upon the key concepts as the model develops.

The initial analysis is presented using the various elements of the conceptual model, below, to focus on and provide a structure for the key themes that emerge. Aggregate cognitive maps are used as a means of presenting statements from all the interviewees concerned with a particular theme. Further analysis is presented to illustrate differences between interviewees based on the descriptive attributes, mentioned previously. To recap, these attributes centre on different levels of information technology usage, organisational position, and organisational section. A set of cognitive maps is used to show the flow of thinking for each interviewee in turn, and the areas where thinking overlaps are highlighted. Finally, the conceptual map is developed in the light of interviewee responses.



This diagram will be revisited in more depth in the conclusions. It should be noted that this model was used as an approach to understanding the interviews, and as such was expected to mature as the interviews progressed.

8.3.2 Organisational Setting

This section describes the organisational environment as perceived by the interviewees. It primarily draws on interviewees' responses to questions 7 and 8, however relevant statements from other questions have been included. The benefit of this section is that it portrays the cultural and working environment in which information technology is utilised, shedding light on the human, as well as technological aspects. Furthermore, the organisational framework colours the interviewees' perception and approach to IT adoption and assimilation.

In recent months the organisation has undergone several fundamental changes in the structure and delivery of its IT systems. Following a successful office relocation it was decided to 'modernise' IT services. This included a radical overhaul of hardware which culminated in the introduction of local area networks for all users. In addition, a Windows environment was established to support an entirely new suite of compatible software. These changes should be borne in mind when considering the interviewees' statements. This is beneficial as it helps to focus user attention on IT issues and is a suitable scenario in which to assess the organisational context and 'culture'.

Perspective of Organisational and Individual Qualities

A commonly held view centres on a belief that the organisation is driven by a technical and/or engineering ethos. The organisation is described by interviewees as *high tech*, *technically adept* and *sound*, and *experienced professionally*. Some respondents take this view further by stating that it is the engineers that drive the business and determine its function. This perspective has ramifications for the innovation and development of new IT ideas, discussed in the section on the adoption process, below.

The common aspects of professional competence and technological ingenuity are responsible for shaping and informing user perceptions of the organisational purpose and role.

The individual is seen as *self-motivated*, *hard working* and *proactive*. This is complemented by a view of the organisation as *innovative*, *streamlined* and *flexible*. All respondents cited company size as an important factor, characterised by statements like, *The company functions like a small company, but with many of the benefits of* [the parent] *Company*. This refers to many of the attributes associated with how small companies operate[1] (flexibility, responsiveness etc.) enhanced by the security that comes with being embedded in a larger multinational framework.

Perspective of Control, Empowerment and Communication

This perspective is distinguished by a marked dichotomy between respondents who felt they were empowered and those that felt isolated and powerless. However, a lack of management communication was frequently cited. In its extreme forms this is portrayed, at best, as:

> *"management communication? - no, not really - engineers run things, management topics are not seen as important"*, [B]

and, at worst:

---

[1]maybe this should read: "with the perception of how small companies operate" !!

> *"what management communication? - they are trying to get closer to the staff, but are actually distancing themselves - its policies and procedures, rather than communicating".* [E]

For some interviewees, this 'distancing' process only serves to foster feelings of isolation.

It is interesting to note that the common themes of 'Organisational Role' and 'Individual/Organisational Qualities' are convergent, i.e. respondents share a similar perspective. By contrast, the theme of 'Power and Communication' is divergent, with respondents' perspectives becoming polarised.

The Recognition of the Importance of IT to the Business

Several aspects concur to encourage the effective use of IT. These may generally be seen to outline the values and attitude the organisation holds with respect to the technology.

A value commonly held is that information technology is seen as intrinsic to the business. This is fuelled by the proactive response of management, who set an example by being seen to use IT in their own work. In addition,

> *"New technology is viewed as a critical success factor by top management"* [G]

Usage is encouraged further by the organisation's technical role, discussed previously. The personnel who make up the technical, engineering backbone of the company are keen to take on board new technology from any quarter. There is even a prevalent 'down to earth' perspective that IT is no more than another tool to help complete the task at hand.

The perspective of individuals as self-motivated, hard working and proactive would appear to follow through into the use of IT. Individuals are encouraged to acquire the computing tools they feel will aid them in their work. To this end, the company size and nature of the business means that work roles are understood and catered for and money is no real obstacle to technology adoption.

The only reservation, expressed by one interviewee, concerned the fact that the variance in user ages appears to influence this perspective. The contention is that older users, whilst recognising the importance of IT to the business, are not keen to apply IT to their own work processes:

> *"The younger folks who have been exposed to PCs are happy using IT and have a hard time on paper, but the older folks refuse to learn these systems. We rely on the older people for their theoretical knowledge and need them to develop applications for the younger people."* [G]

Time as a Barrier

The only factor which would appear to discourage effective use of information technology is time. Several interviewees mentioned that the demands of their work meant that they could not make full use of the available technology. In spite of the fact that interviewees make extensive use of IT, they recognise that if they were able to make more time available their relative effectiveness would improve. However, the effective use of IT must be weighed up against the effective use of time to the job as a whole.

Figure 8.2 summarises what encourages and discourages the effective use of IT from the organisational perspective.

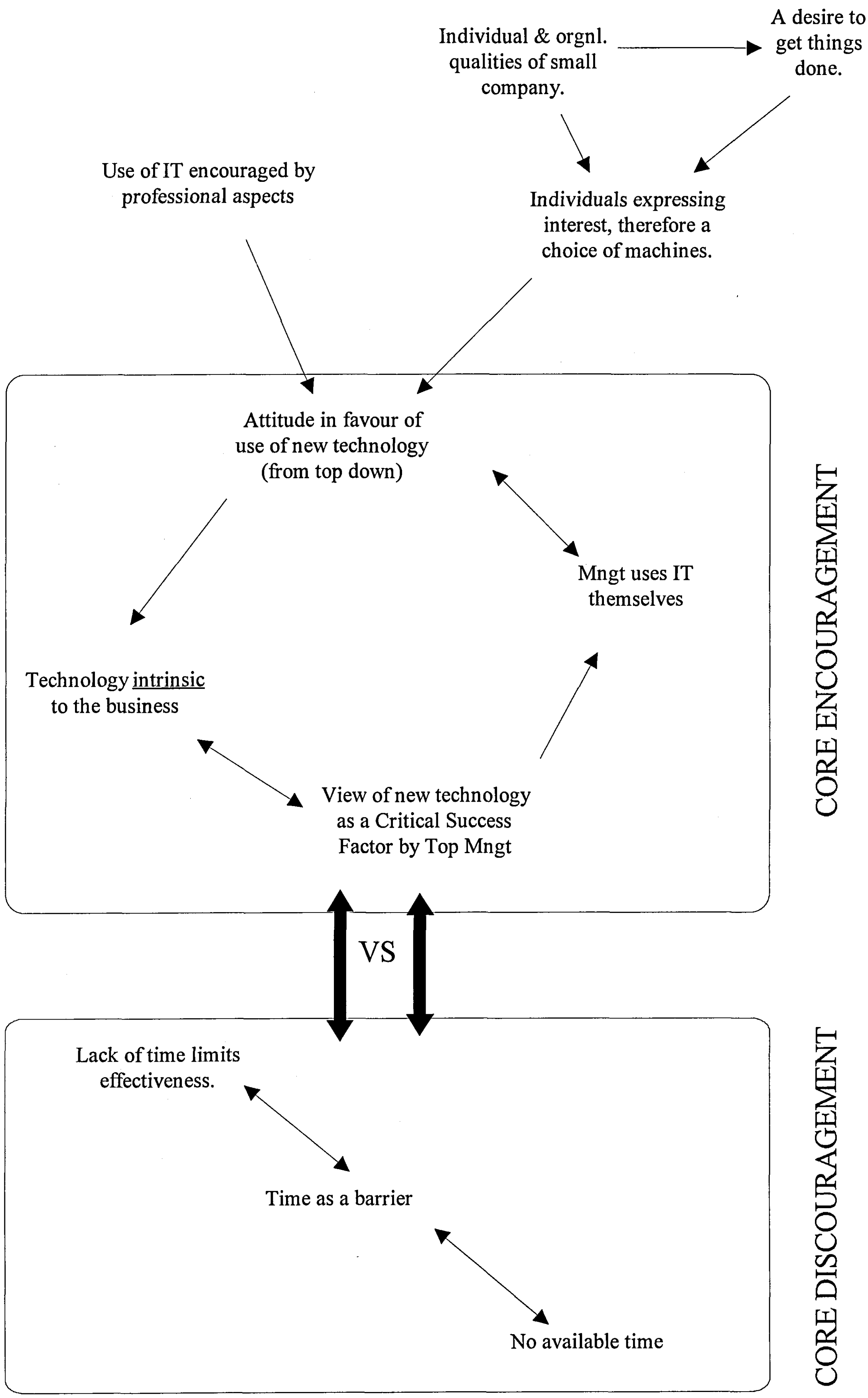


Figure 8.2 - Organisational Aspects Which encourage or discourage the effective use of IT

8.3.3 The Adoption Process

This section addresses the IT adoption process. It essentially draws on interviewees' responses to questions 1,2 and 3, however statements from other questions, which shed light on the adoption process, have been included.

Origin of ideas

When asked to discuss where new ideas originate with respect to the adoption of IT, respondents fell into three categories. These categories consist of either extreme, IT staff or users, or alternatively that ideas originate by some mix of the two groups.

1. CSG (Computer Services Group) & IT Directed [A,C]
According to this perspective the process of IT innovation is an IT function directed activity. New ideas originate locally within CSG or more broadly at the corporate IT level and such ideas are a response to the computing market place. New ideas are seen to be implemented *regardless of user views* [A].

2. User Directed [D,F,G]
The opposite perspective existed, that new ideas have their origins with the users and are left to CSG to develop. User needs and requirements drive the adoption process. Each function assesses its computer needs and the best route for achieving them. CSG is only called on for technical expertise in working out a specification. One interviewee stated that:

> *"the ideas that stick come from the engineers and customers. Some ideas come from CSG but the self-generated ideas are far more successful. Now this situation is reinforced by the use of a 5 year plan which reflects customer input"* [G]

To summarise, users are seen as responsible for the definition of needs, whilst CSG are left to implement new ideas.

3. Mixed Origin [B,E,H,I]
This perspective implies that the origin of new ideas is, in some way, the result of a combination of CSG and users. Unlike the user directed perspective, outlined above, it is CSG who are responsible for creating *new ways of doing things* [E], so there is *little scope for user developed ideas at a structural level* [H]. However, once this CSG

dominated IT framework has been implemented it is the users who *see the need by interacting with the customers* [E] are free to apply IT to their work *at their own discretion* [I]. *Working level control lies with the individual users* [H]. To summarise:

> *"CSG generate new ideas, but once implemented users realise the potential themselves"* [B]

A difference of opinion exists as to who has the final say. Some see final decisions as a compromise between users and CSG, whilst others state that CSG has the final word, but would not act to discourage user involvement.

What Helps the Process

The aspects which are seen as helping the adoption process are primarily either attributes of the company or attributes of the Computer Services Group.

The relative organisational wealth, coupled with the recognition of the importance of IT, means that EEEL is *liberal in funding hardware and software* [G]. Such investment is believed by users to put the company at the technological forefront. Company size is recognised as supporting this position. The organisation (EEEL) can draw on the depth and breadth of its parent organisation (Exxon) and yet is small enough in its own operations to focus these resources effectively.

The second cluster relates to the attitude and approach of CSG. CSG is noted for its *interaction with users so that they are aware of users' needs* [F] and generally for *giving a lot of freedom* [B]. The small company focus means that CSG are able to cope with support; a benefit realised by the users in terms of quality training and the ability to *hand hold users through new things* [G].

What Hinders the Process

The aspects which hinder the adoption process can be grouped into two central themes. These are the nature of change and user involvement in the adoption process.

The Nature of Change

The perception held by some users of the process of change, as new information technologies are adopted, can be described as driven by a technology push. This argument has been covered in some detail in part one of this thesis. Users recognise that *CSG feels the need to be at the leading edge of IT* [D] and that this is the central motivating factor fuelling the adoption process.

The rapidity of change, i.e. the relative speed with which change occurs, has a direct impact on user perceptions. It is reasonable to view the rapidity of change as an impact as users feel that they are on the receiving end of change. This provides the overlap with the lack of user involvement, described below. Interviewees sighted the poor timing and frequency of changes as major impediments to the adoption process. Furthermore, such changes have taken place without the acceptable consideration of users. It is important to note that these change constraints do not become manifest until the assimilation process.

> *"Before you have assimilated the latest technology it is out of date"* [D]

Whether these are hindrances to the adoption process, rather than the assimilation process is debatable. However, it does stress how both processes are intertwined. Furthermore, it must be stressed that both adoption and assimilation are processes, both interacting and occurring simultaneously.

User Involvement

The focus of the second theme is that there is a general feeling amongst users that they are, to a greater or lesser degree, excluded from the adoption process. Statements like, *there is an imposition of change without regard for user needs* [H], and *we are strong armed into using certain packages* [B] serve to illustrate this point. However, further questioning revealed that, on the whole, the interviewees considered their involvement to be far higher than in many other organisations they had experienced both within and external to the Exxon Corporation. Rather, their feelings of exclusion were fostered by a wish to play a more active role and be involved to a greater degree than at present. Some interviewees identified aspects which would help the process; in essence that *increased prior consultation with users* [H] and *a standardised approach for like minded users* [I] would engage users in the IT policy debate. It would seem reasonable to assume that such a perception is nurtured by the aspects of the organisational culture, mentioned previously.

All interviewees were quick to recognise that such a lack of involvement, for whatever reason, directly and detrimentally influences the assimilation process.

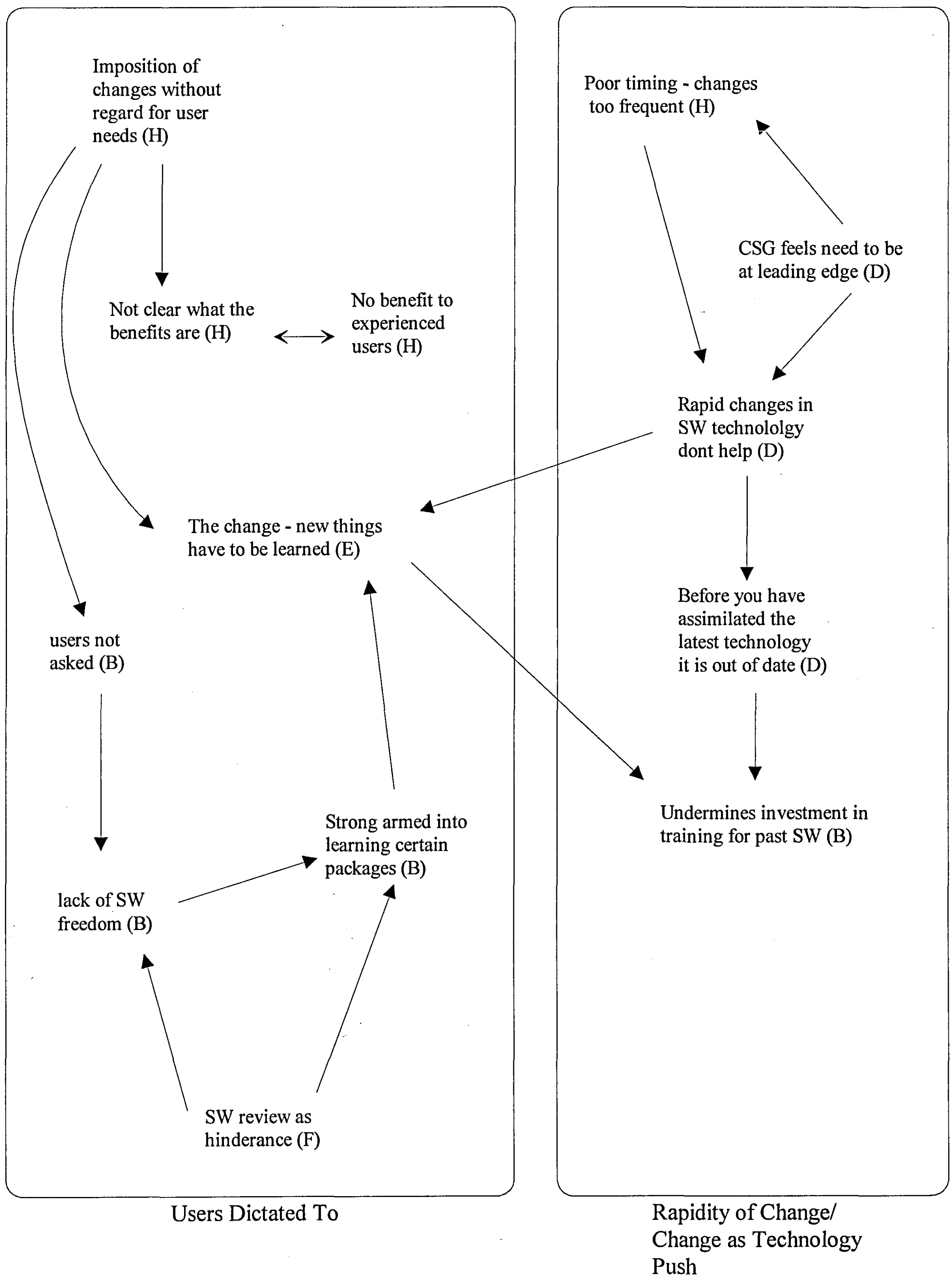


Figure 8.3 - Interviewee Understanding of the themes that Hinders the IT adoption process.

User Satisfaction with the Process

The interviewees overwhelmingly stated that users felt generally satisfied with the IT adoption process. A common thread was that users are dissatisfied with certain points; they are *not keen on certain details, rather than concepts* [D]. One respondent stated that:

> *"There is dissent in terms of complaining, but when people sit back they realise all of the positive aspects"* [E]

Such apparent high levels of satisfaction are fostered by the belief that *people get what they want when they want it* [C].

> *"The flexible approach of CSG and the company as a whole - if a development is good for business then it is acceptable. Rules are only there for guidance and do not constrain the business"* [F]

Dissatisfaction would appear to relate to the system changes that have taken place within the organisation. One respondent remarked that people who were knowledgeable about personal computers were, on the whole, in favour of the changes, whilst users whose knowledge was limited were naturally more comfortable doing things the way they were used to. The change generated statements like "what was wrong with before?". Some of the dissatisfaction is attributed to the way the transition period was managed, due to a *lack of piloting procedures etcetera* [I]. It was further suggested that much of the dissatisfaction could have been avoided if the benefits had been fully explained [B].

8.3.4 The Assimilation Process

This section aims to reveal the process of assimilation of IT. Understanding of this process is predominantly based on the responses given to questions 4, 5 and 6. Once the technology has been adopted (as described previously) it needs to be incorporated into work roles. The users' understanding of this process will be explained, followed by their observations on the constraints and perceived areas for improvement.

In essence, assimilation is seen as requiring a group of key "ingredients". These are that the technology in question is readily available, users can invest the time to use the technology, and that users have acquired, or can acquire, the necessary knowledge and understanding of the technology. Crudely speaking, the more that each ingredient is made available the greater the degree of assimilation on the part of individual users and the organisation as a whole. However, it must be noted that the three ingredients are necessary, but not sufficient criteria.

Constraints to Assimilation

The major constraints identified by interviewees fall under three headings. These headings correspond directly with the elements of the assimilation process mentioned above. Interestingly, interviewees only focused on one element each as a constraint.

The availability of IT solicited several comments, ranging from hardware downtime and problems with the LAN server through to a lack of particular software packages. More detailed responses reflected unease with working within the bounds of particular information technology environments, for example, *my core objection is having to work with this operating system* [B].

Another common thread is the question of time. For several interviewees the availability of time is cited as the main constraint to learning and developing their use of IT. A lack of available time has ramifications for acquiring new skills in that it is a major constraint to training.

> *"Time is the major constraint to advancing beyond my current expertise, as my workload must always take priority"* [H]

More fundamentally, the issue of available time is perceived as being embedded in the organisational culture. Interviewees were inclined to see this as an intractable problem, and appeared resigned to the status quo. The general conclusion was that the effective use of IT must be weighed up against the effective use of time to the job as a whole.

Two interviewees recognised that their own knowledge, and that of fellow users, is fundamental to the assimilation process. Generally, *not enough is known about what* *certain systems can do* [F]. Increased knowledge, resulting from training and experience, generates a trust amongst users of their own abilities. Users' perceptions of their own understanding can foster doubts over their own ability to innovate, for example:

> *"The limitations of what I can imagine I can do, rather than what I am probably able to do hold back my use of information technology"* [E]

Grounds for Improvement.

When asked whether they believed they were using computers to the best of their ability only three of the nine interviewees said they were not. However, when all interviewees were pressed further a number of areas for improvement were identified.

Certain issues lie beyond the control of CSG, whilst others could be addressed within the framework of current CSG operations. The availability of time was cited as a reason why many users only make 80 to 90% effective use of IT. The demands on time have previously been addressed in the section on Constraints to Assimilation and earlier when outlining the Organisational Setting. Two interviewees specifically stated that the time constraint hampered attendance of training sessions.

Of the issues that can be addressed by CSG the most common focus was training. This will be discussed in full later in this section. The issue of flexibility was mentioned :

> *"Ideally it would be best if CSG could give people computers for their needs. People work best in different environments (e.g. VAX, workstation etcetera) - it effects their productivity"* [B]

A further issue, that of CSG's responsiveness, was of concern to two interviewees, one of whom stated:

> *"Support is not all it might be due to the poor quality of the help desk facility and troubleshooting elements"* [H]

The variety of some respondents' work roles implies that they require a higher calibre of consulting and troubleshooting than might normally suffice and that such facilities need to be reliable in terms of availability and knowledgeability. The raising of the issues of responsiveness and knowledgeability serve to reinforce the findings from the user perceptions questionnaire (chapter 7).

Training as a Means of Assimilation

The results of the user perception questionnaire and follow-on discussions with key management personnel established that training is currently a 'hot' topic within the organisation. However, these enquiries did not reveal the full extent of opinions on current approaches to training, nor what training users felt would best suit their needs. Consequently, question 6 was introduced to the interview questions to focus attention on this matter and to elicit possible 'solutions'.

All interviewees were of the opinion that enough training was made available. However, half of those interviewed stated that time pressures, created by their work roles, impinged on their attendance, whilst the remaining interviewees raised doubts over the quality of the training provided. In stating that the quality of training was not good enough interviewees did not mean that training was badly delivered, but rather that it did not match up to their requirements. Two themes emerged from this viewpoint. First, training is not specified to the needs of the user. The general feeling was that training needed to be tailored to the different work activities of users so that they can see the relevance and worth of what they are learning, and in order for them to understand how best to apply what they have learned. Second, training sessions are not designed to match the different levels of knowledge which different users acquire during the assimilation process. Interviewees quoted the emphasis on beginner courses as evidence of this.

Possible improvements on the current approach to training fall into three categories:

1. Reducing training periods

This solution revolves around the notion that by reducing the length of periods of training it becomes easier for users to afford the time. This implies that shorter but more frequent training sessions are required. Interviewees suggested three techniques which would aid this approach. The idea of lunch time sessions was mentioned [C, I]:

"It would be ideal if [training] sessions were held during lunch times, then I could spare the time and I wouldn't feel as if I was wasting valuable working time" [I]

Also, there was a desire to see a selection of 'tips and tricks' sessions established [D,G,H]. Basically, this would involve the trainer demonstrating a handful of useful pointers and shortcuts for the user to employ in their own IT applications. Furthermore, the use of the Newsline magazine[2] was suggested to detail new points which may be of general interest or provide solutions to frequently experienced problem situations [H].

2. Building up training periods

One interviewee [G] suggested that, rather than reducing the length of training sessions, it might be better to increase the time taken. The interviewee described this idea as 'total immersion' training. Users would be removed from their normal working environment and continuously exposed to all manner of computer-based practical exercises. The justification for this approach would be that a prolonged and intensive training session, without distractions, would 'force' the user to learn and cover all the aspects they require. Furthermore, the perceived value of such training would be easy for the user to justify.

3. Complementary Responses

This solution focusing on other activities, rather than specific training sessions. Interviewees in this category [B,D,E,F] expressed a strong desire to receive a more focused training, specific to their work tasks. Consequently, it was not felt that a traditional training approach was suitable, but that some form of improved troubleshooting was needed. This approach would require support personnel to provide detailed, 'on-the-job' training as user problems arise. This approach is viable as it provides a work related focus for training activities, however it places greater time demands on support personnel. For this approach to be successful particular support personnel would need to be allocated to this specific activity.

It is interesting to note that all four interviewees with high levels of overall IT usage and high discretionary usage (questions 1 & 2 in the questionnaire - chapter 7) stated

[2]An internal company-wide magazine detailing current organisational events etc.

that they thought some form of complementary response was required, whilst the four interviewees with low usage expressed their training preferences in terms of the time it took to train. This illustrates that as a user's ability to assimilate IT improves their training requirements change accordingly. It would appear that once a certain level of basic IT skills have been acquired the user begins to look for ways of applying this knowledge to their own work. The following diagram (figure 8.4) shows interviewee statements related to this debate.

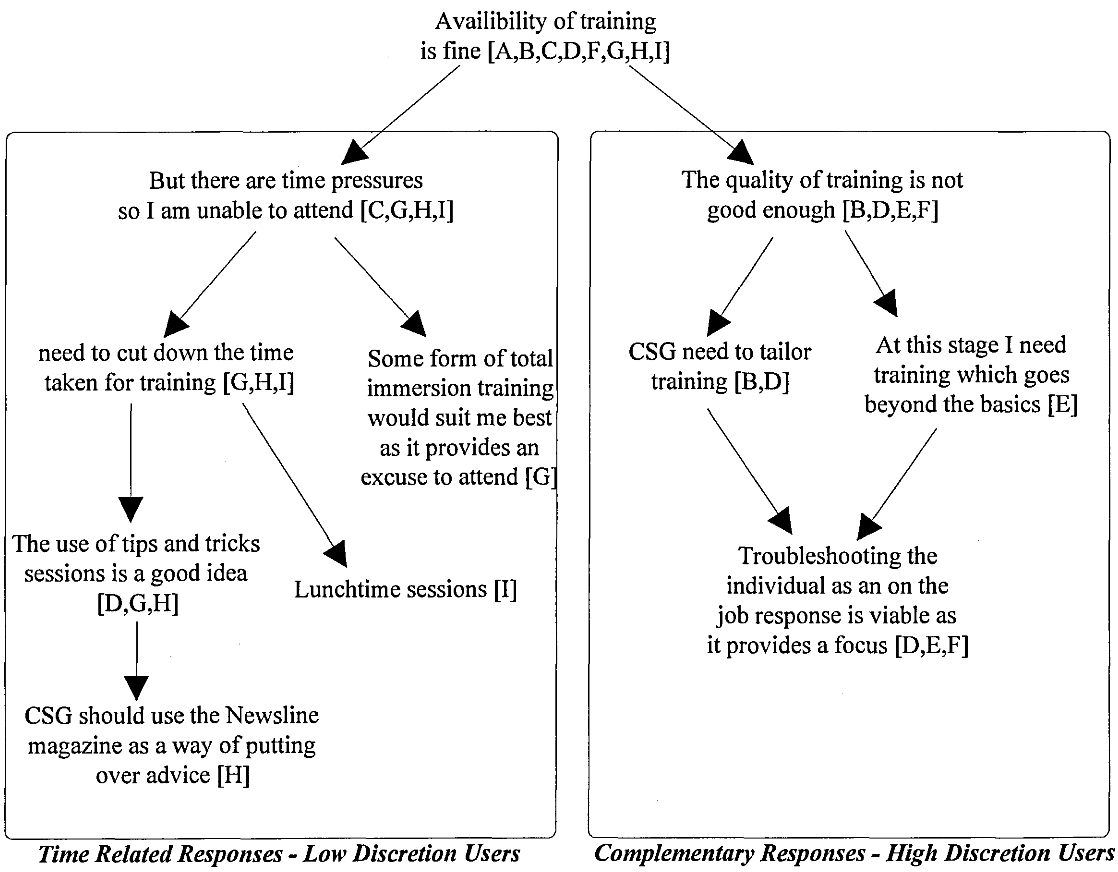


Figure 8.4 - User Suggested Training Improvements

8.3.5 Cognitive Mapping of Interviewee Responses

This section discusses the statements of each individual in turn. Extensive use is made of cognitive mapping techniques as a way of demonstrating the flow of interviewees' ideas and thoughts (see sections 8.2.4 and 3.5.3). A loose framework based on the conceptual model (see section 8.3.1) has been imposed on each set of statements. The nine maps represent figures 8.5 to 8.13.

Interviewee A

Interviewee A can be seen as representative of users in the second usage cluster, i.e. secretarial staff. This helps to understand the issues raised in the cognitive map (Figure 8.5).

It is clear from the cognitive map that the interviewee has an operational or functional perspective. The perception of IT adoption and assimilation is focused on specific software issues fixed firmly within the job boundary. Management is seen as removed from the interviewee and this appears to influence the perception of the adoption process. Developments in IT are seen as being driven by the IT personnel with little or no consideration of the user's operational requirements. The interviewee's understanding of the assimilation process is articulated in terms of training requirements, however there is recognition of some of the restraints of formalised training.

Interviewee B

The cognitive map (Figure 8.6) shows that interviewee B is able to take a strategic perspective. Issues beyond the bounds of his work job function are considered and organisational factors are taken into account. There is a recognition of higher level technical issues, and an understanding of the effects that technology has on productivity. More fundamentally, the interaction between IT and users is clearly understood. With this in mind, the costs associated with assimilating technology and the ways in which different users wish to employ IT are stressed.

The interviewee does not view the assimilation process as merely the act of attending training courses, but rather as a process of learning from applying IT to work roles:

> *"There is a need to tailor training courses, but generally, I don't learn from courses, rather I learn from doing"*

Interviewee C

Figure 8.7 suggests that interviewee C views the adoption and assimilation of IT from the operational level, as highlighted with interviewee A. New IT ideas are seen as

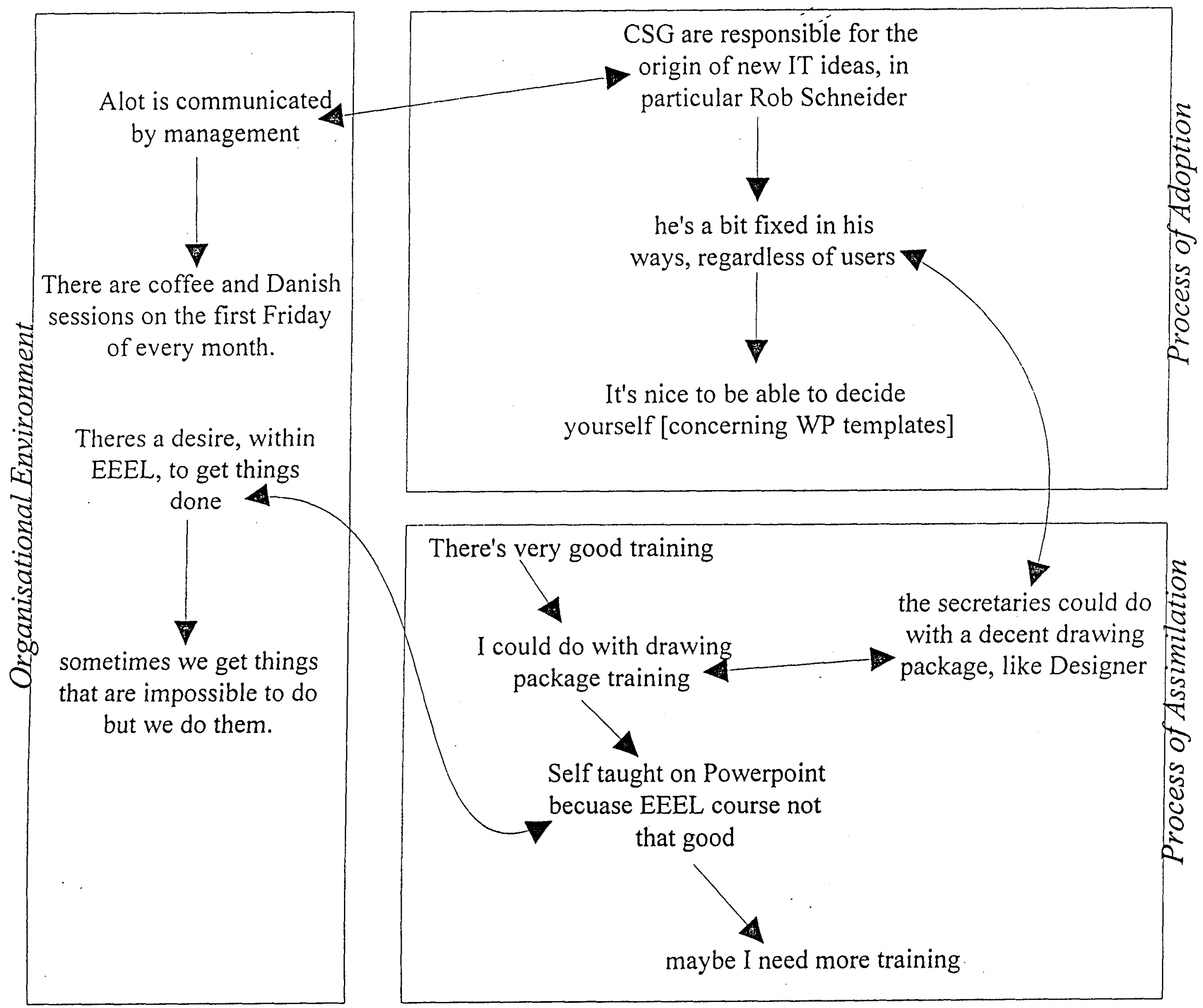


Figure 8.5 -
A Cognitive Map of the Processes of Information Technology Adoption and Assimilation for Interviewee A

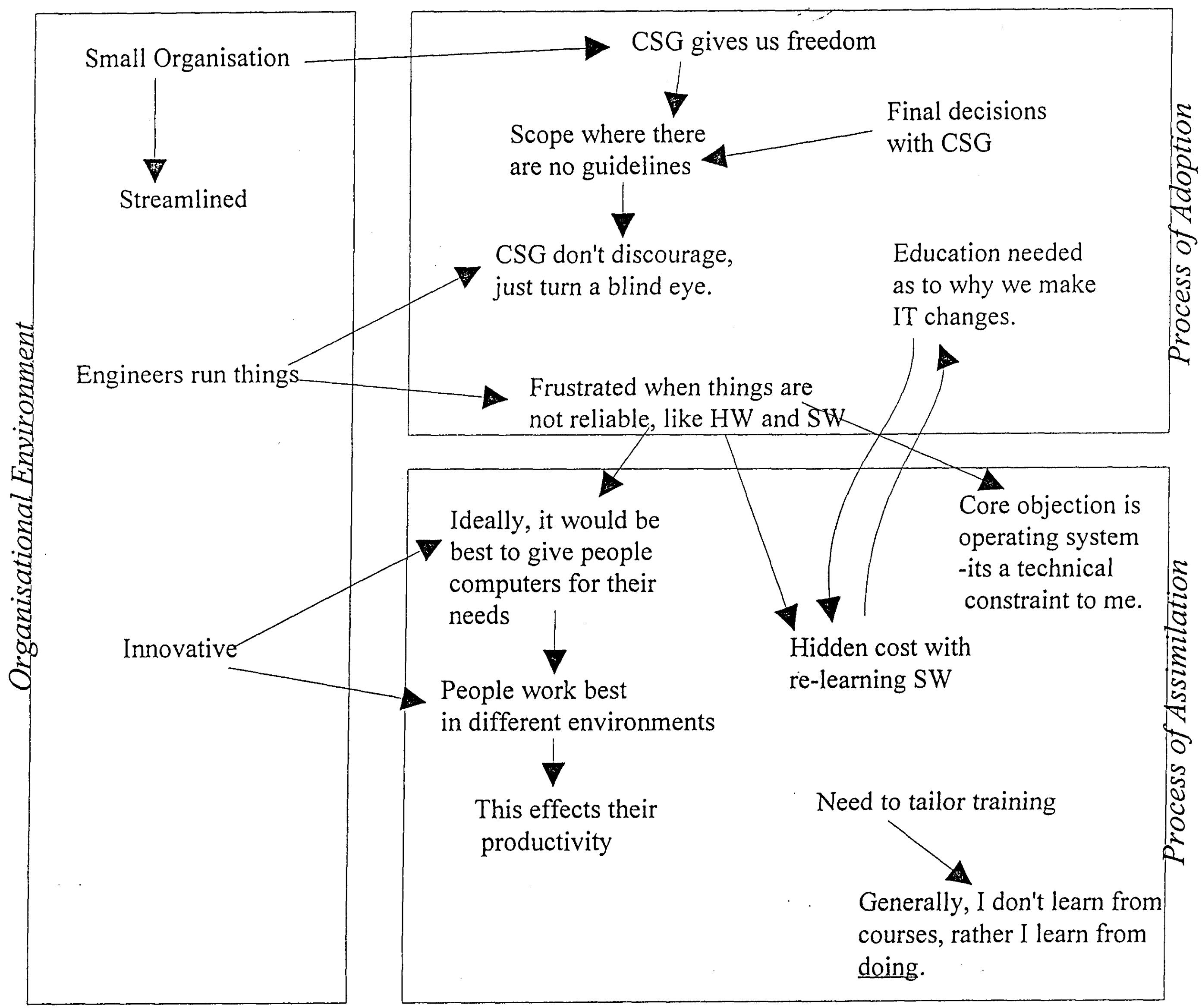


**Figure 8.6 -
A Cognitive Map of the Processes of Information Technology Adoption and Assimilation for Interviewee B**

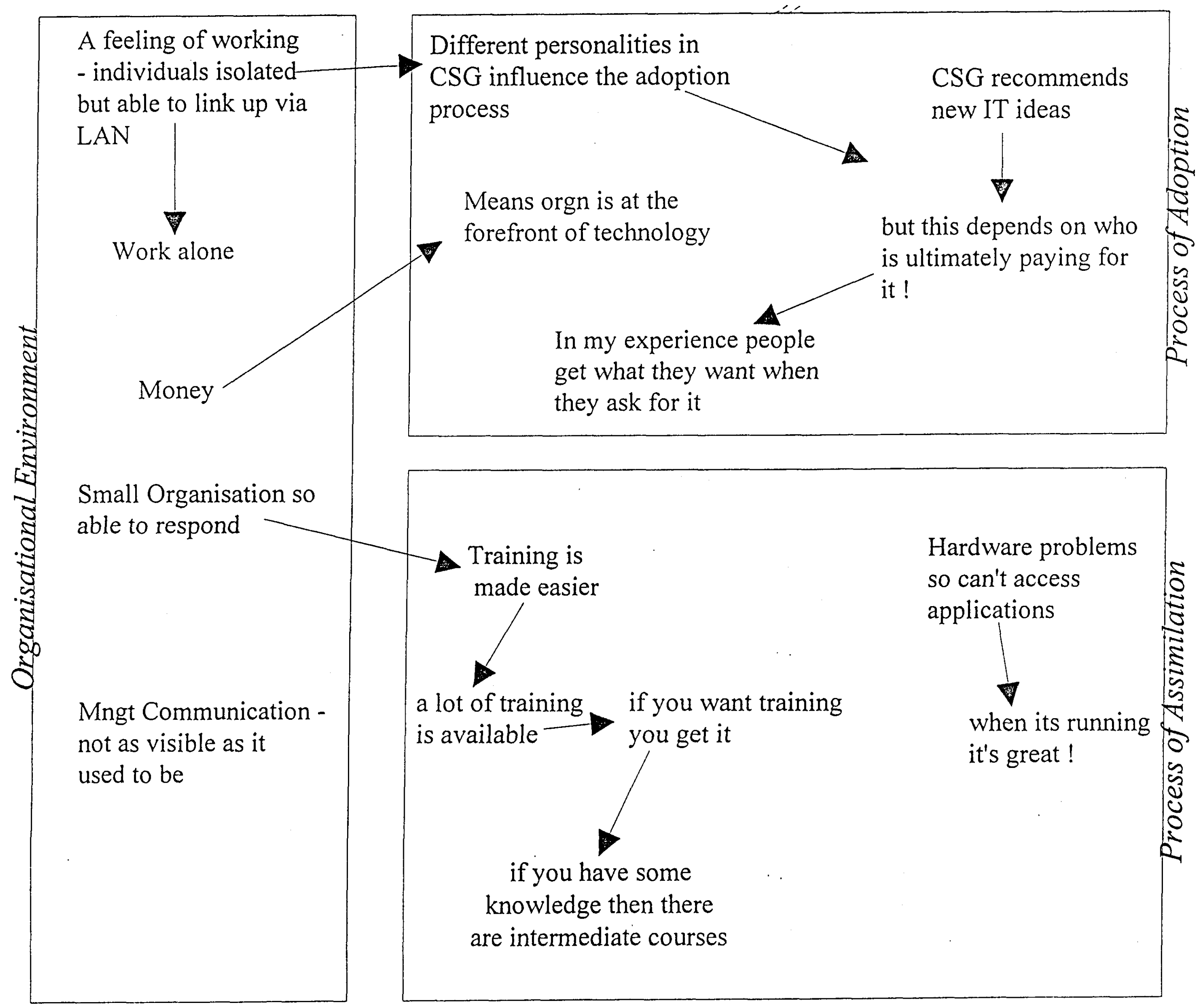


Figure 8.7 - A Cognitive Map of the Processes of Information Technology Adoption and Assimilation for Interviewee C

originating with the Computer Services Group (CSG), with the suggestion that the interviewee plays a passive role, as someone who technology 'happens to', rather than 'interacts with'. It can also be noticed from the cognitive map that there are no distinct flows of thinking from the adoption process through to the assimilation process.

Interviewee D

In Figure 8.8 the importance of technology to the organisation is demonstrated and the strategic aspects are understood. Furthermore, interviewee D points out the relationship such organisation characteristics have with the adoption process.

Several statements establish the importance of periods of technological change. A process is identified whereby a set of adoption changes are followed by a period of assimilation which in turn informs later adoption issues. Coupled with this theme is the belief that assimilation requires more than training. Finally, organisational time constraints are identified and related to the assimilation debate.

Interviewee E

Many of the themes mentioned by interviewees B and D are reiterated by interviewee E (figure 8.9). These are that the organisational culture is proactive in terms of new technology, the assimilation of IT reaches beyond initial training sessions, and that the process of technological change creates constraints for the assimilation process.

Of particular interest, interviewee E expands on the qualities of the individual users as an influence on assimilation.

Interviewee F

Because interviewee F has a formal role in the IT selection procedure it is, perhaps, not surprising to find such a detailed perception of the adoption process (figure 8.10). Adoption is seen as an iterative and interactive process informed by user needs, external customer requirements and the technical input from CSG. In addition, both formal and informal activities are sighted.

Again, the need to focus training and provide some means of allowing users to apply what they have learnt is evident. This closely mirrors the 'user task problem solving' support activity described in Chapter 7. However, it is interesting to note that the

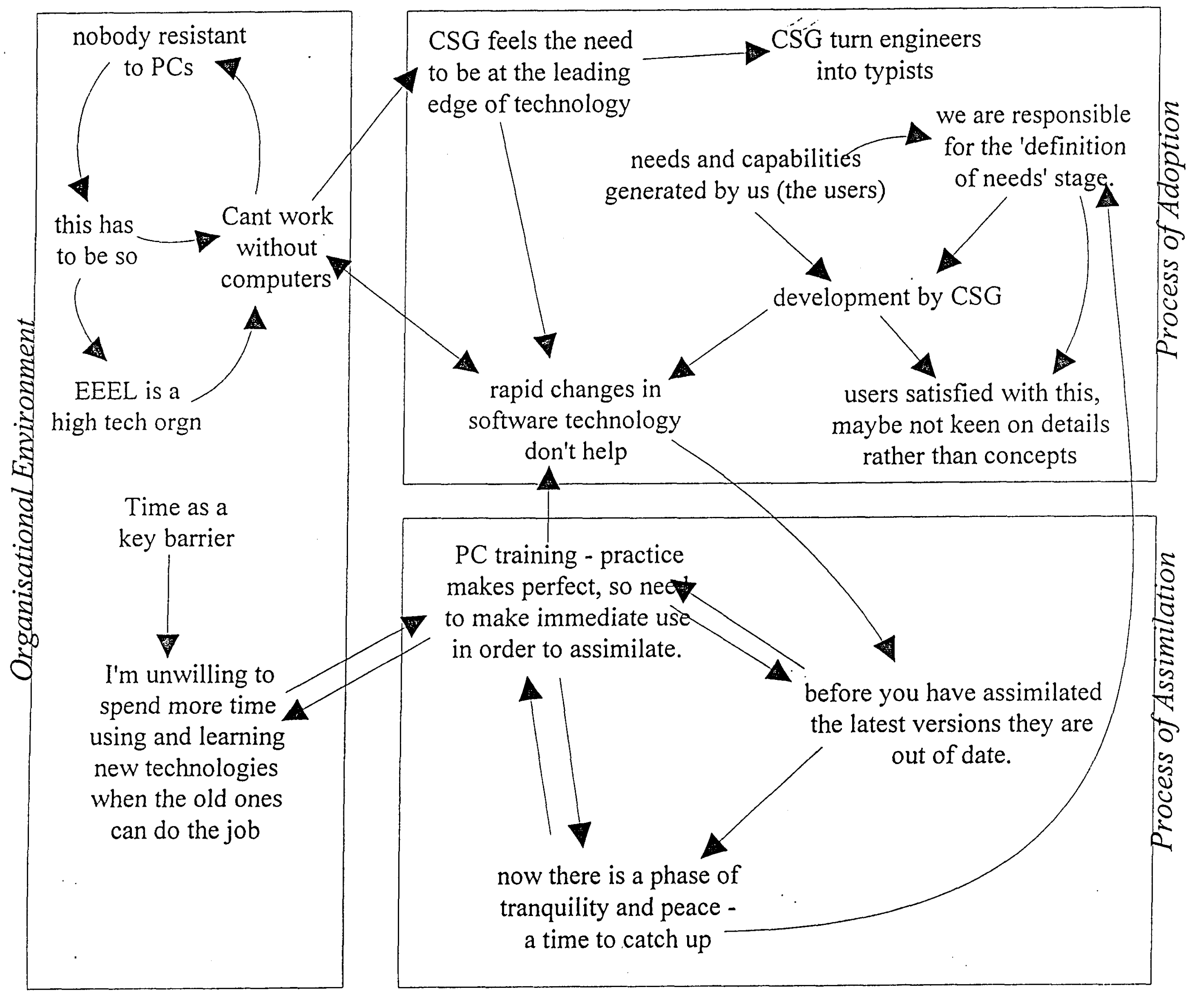


Figure 8.8 -
A Cognitive Map of the Processes of Information Technology Adoption and Assimilation for Interviewee D

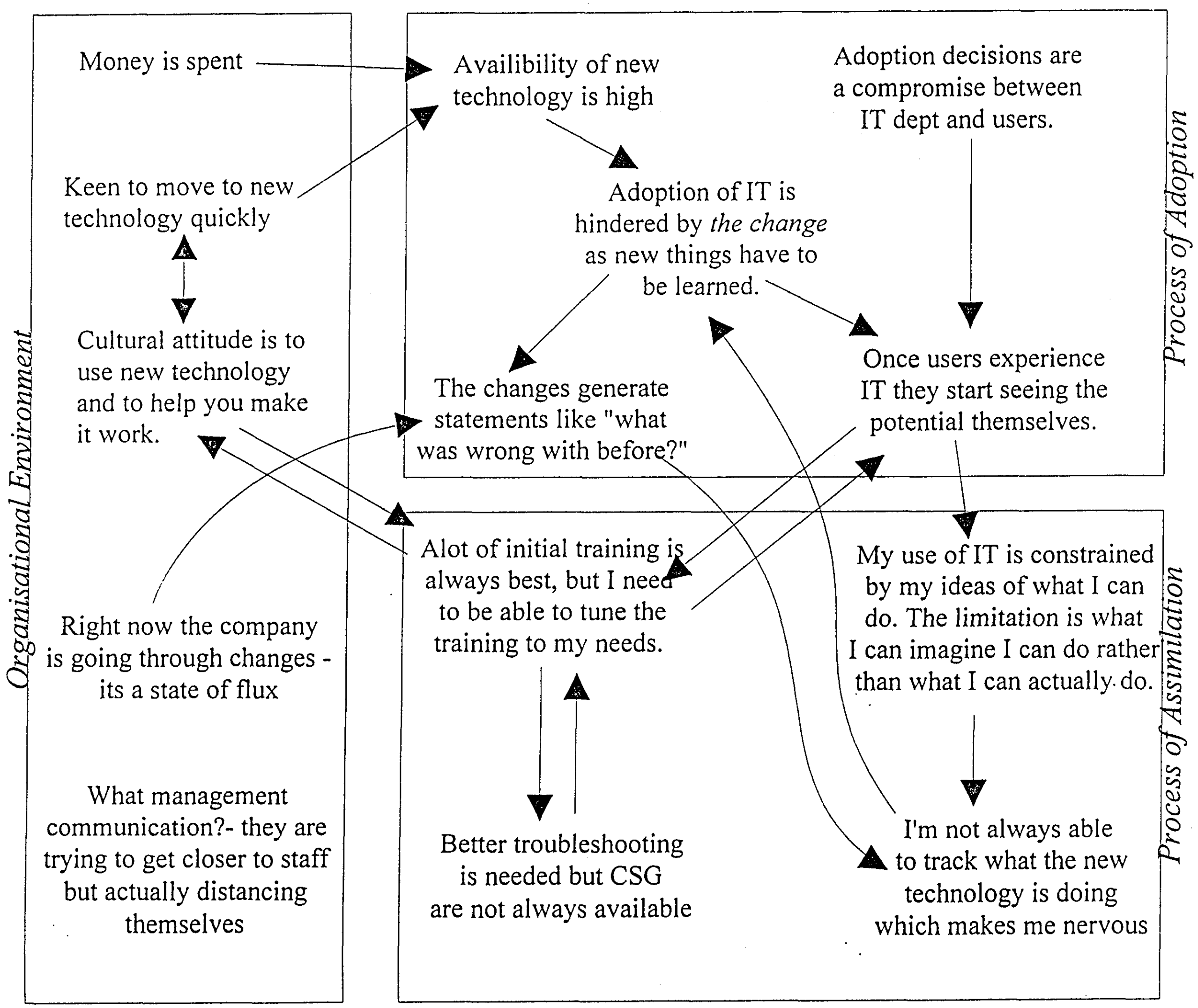


Figure 8.9 -
A Cognitive Map of the Processes of Information Technology Adoption and Assimilation for Interviewee E

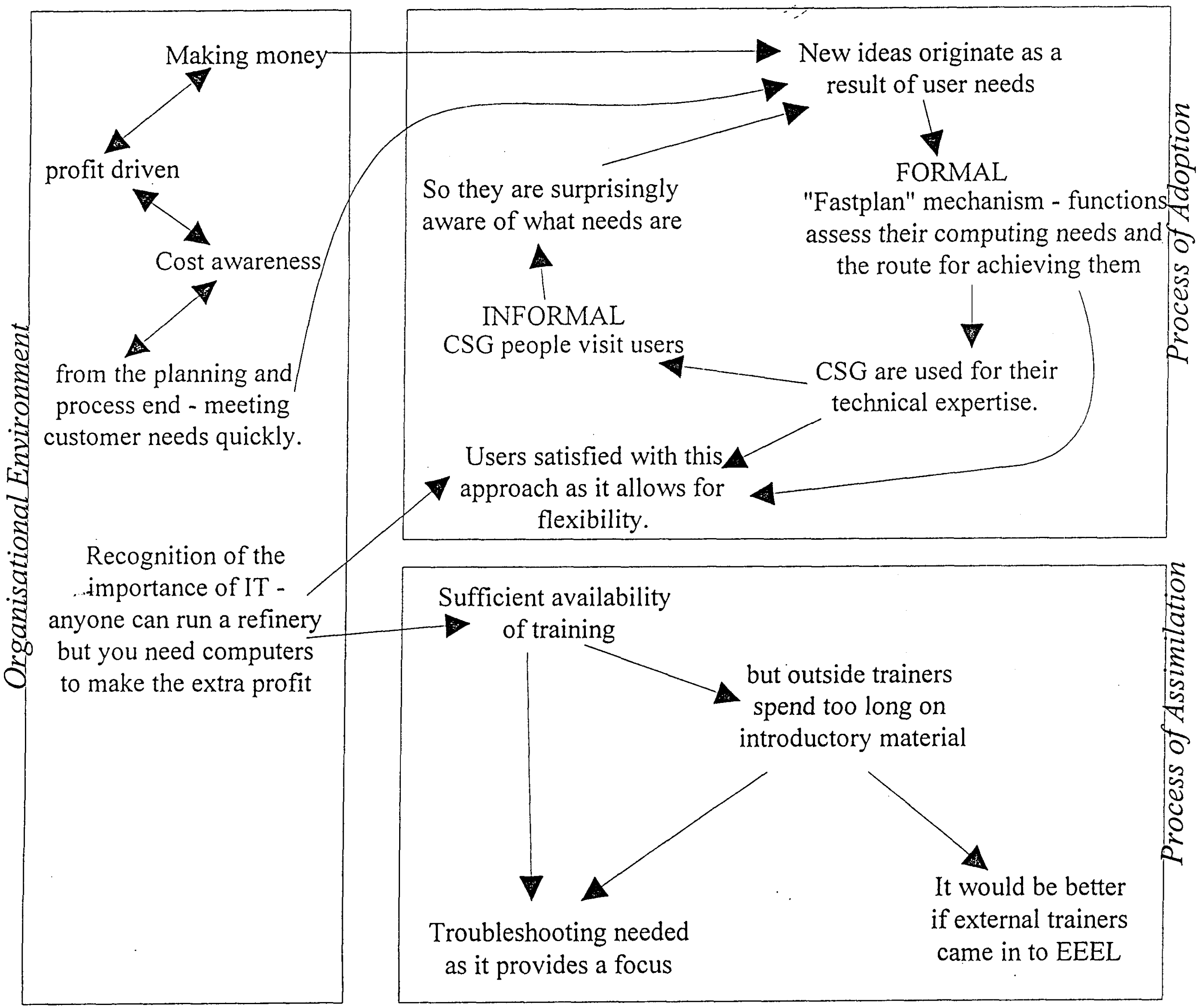


Figure 8.10 -
A Cognitive Map of the Processes of Information Technology Adoption and Assimilation for Interviewee F

interviewee makes no connection between the elements of the adoption process and the elements of the assimilation process. The only link is made through organisational characteristics, in particular the strategic perspective of the importance of IT.

Interviewee G

The cognitive map (figure 8.11) further illustrates several of the key themes. In the words of the interviewee:

> *"IT is seen as a critical success factor which will make or break the business"*

Organisational innovations in IT are seen as the result of a combination of user and CSG inputs. However, the map implies that the better, more successful ideas originate with users. Whilst no connection is made by the interviewee, this perception has implications for the assimilation process in that the further users assimilate IT the greater their contribution to the adoption process is likely to be.

Interviewee H

Interviewee H (figure 8.12) recognises the strategic perspective, mentioned previously. The cognitive map shows, however, that the interviewee recognises that users can generate new IT ideas, but that in practice change is imposed without regard for user needs. Users are seen as making a greater input to the day to day working level, rather than at the IT structure/policy level.

Insufficient training is identified as the key factor holding up the assimilation process and the time constraint (organisational environment) is sighted as a major contributor to this problem.

Interviewee I

In figure 8.13 it is clear that the interviewee has an operational perspective. There is a focus on functional issues such as day to day technical and support problems. The adoption process is viewed as being driven by IT personnel and assimilation concerns relate to the availability of training. To summarise, the interviewee *reacts* rather than *interacts* with information technology.

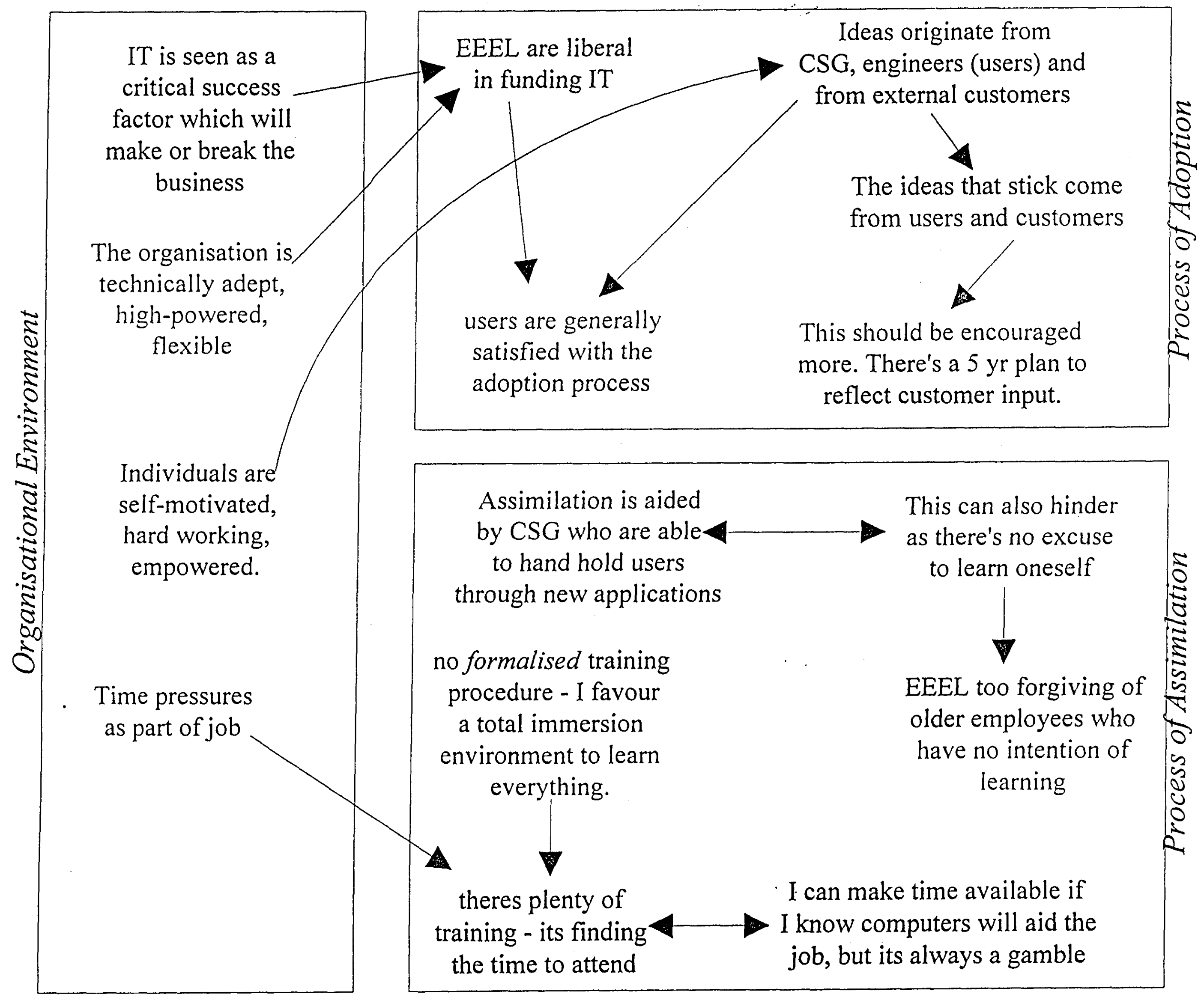


Figure 8.11 -
A Cognitive Map of the Processes of Information Technology Adoption and Assimilation for Interviewee G

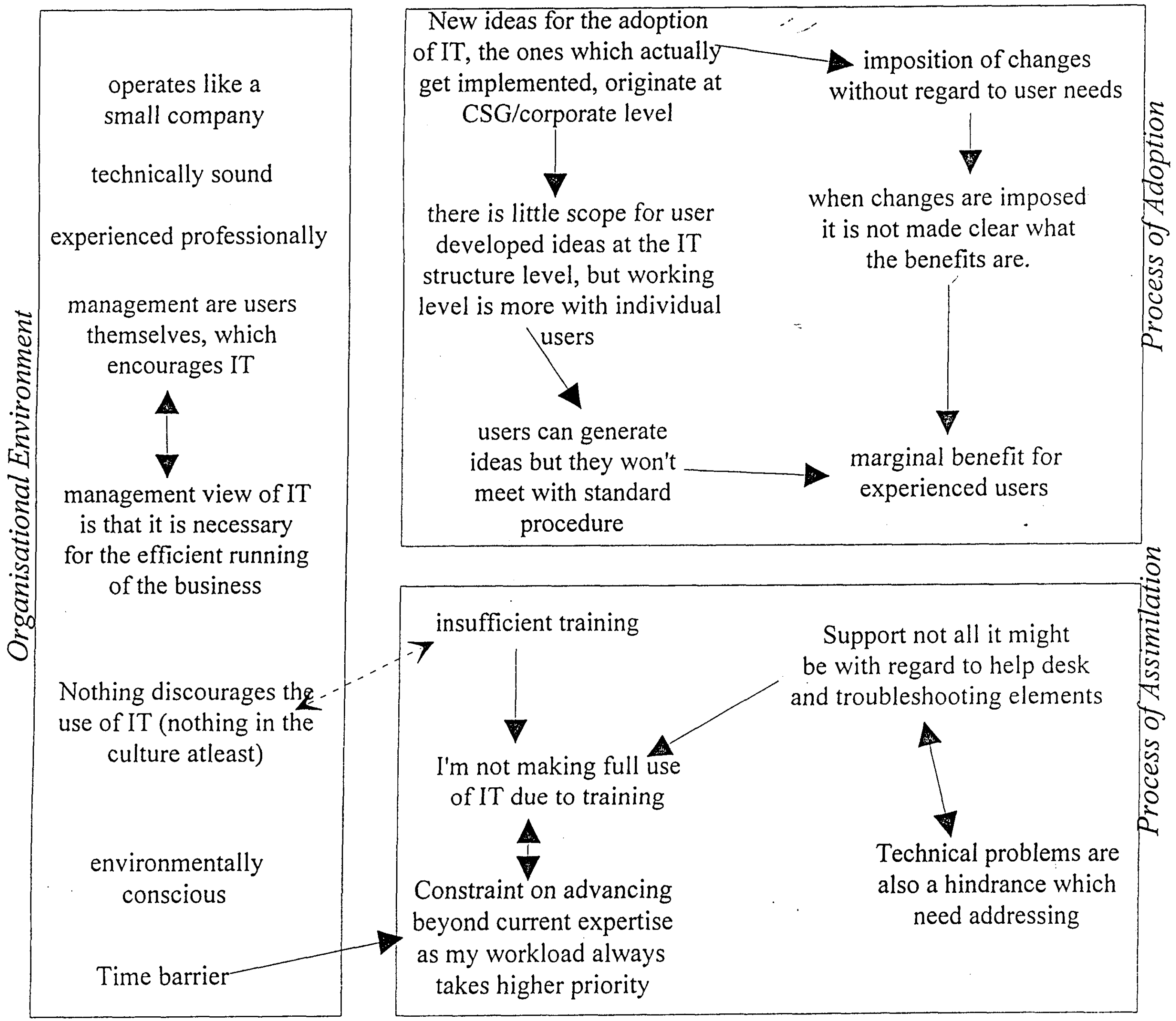


**Figure 8.12 -
A Cognitive Map of the Processes of Information Technology Adoption and Assimilation for Interviewee H**

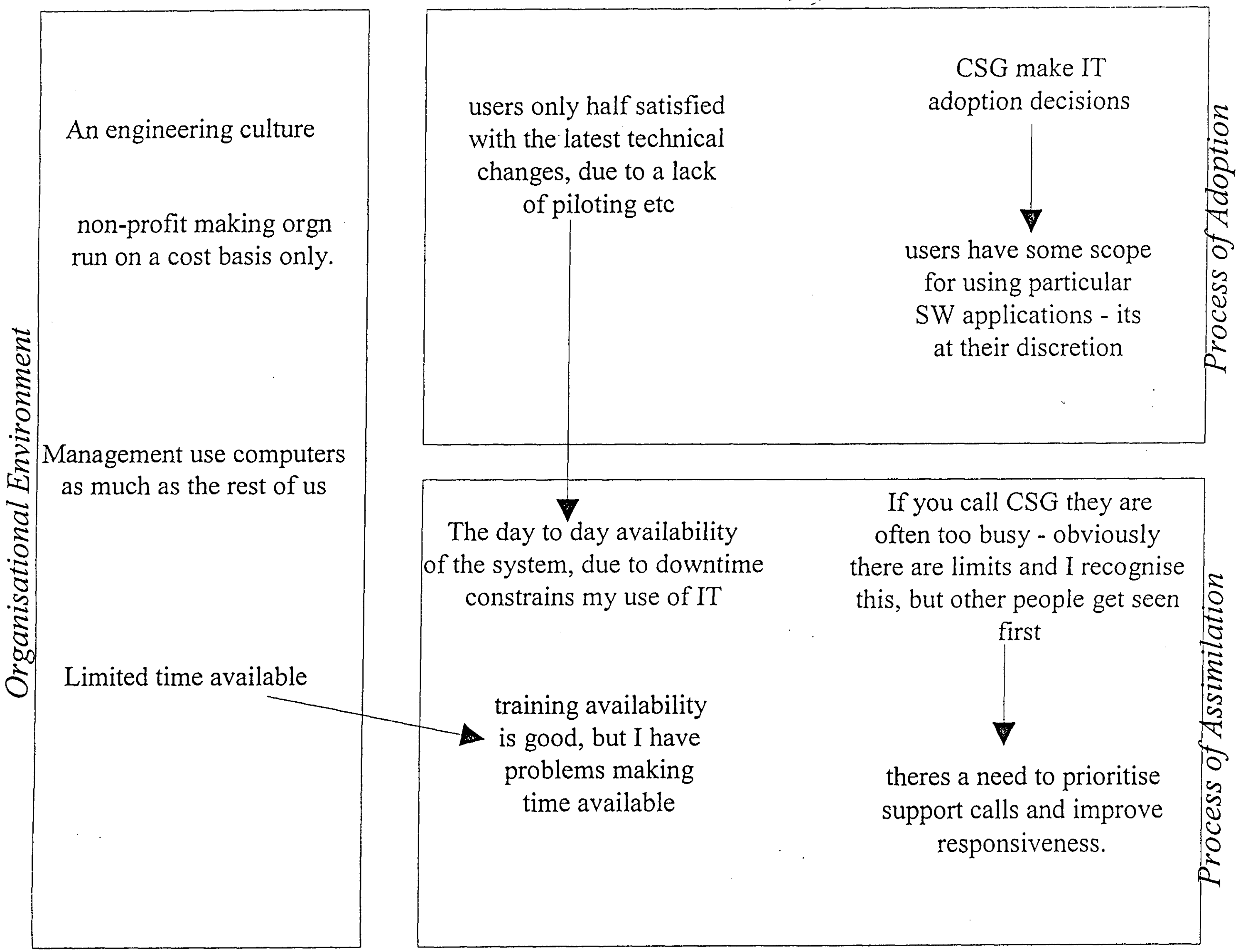


Figure 8.13 -
A Cognitive Map of the Processes of Information Technology Adoption and Assimilation for Interviewee I

8.3.6 Aggregate Findings

In this section the themes raised by the individual cognitive maps are pulled together as a means of addressing the different interviewee attributes, namely levels of usage, organisational position and organisational section. These attributes are related to the themes of :

i. *Origin of IT ideas* -
represented as either 'CSG' directed or a 'mix' of user and CSG discussion.

ii. *Organisational Perspective with respect to IT* -
represented as either 'strategic' or 'operational'.

iii. *Point of Assimilation* -
represented as either a 'training' focus or a 'task' focus.

iv. *Degree of interaction with IT* -
represented as either 'active' or 'passive'.

Division by Level of Usage:

Cluster	Inter-viewee	Origin of IT ideas	Organisational Perspective	Point of Assimilation	Interaction with IT
High usage	**B**	Mix	Strategic	Task	Active
High	**D**	Mix	Strategic	Task	Active
discretion	**E**	Mix	Strat/Oper	Task	Actv/Passv
	F	Mix	Strategic	Task	Active
Low usage	**C**	CSG	Operational	Training	Passive
Low	**G**	Mix	Strategic	Training	Actv/Passv
discretion	**H**	CSG	Strategic	Training	Passive
	I	CSG	Operational	Training	Passive
Secretarial	**A**	CSG	Operational	Training	Passive

Table 8.1 - Aggregate Themes By Cluster

With reference to Table 8.1, it is possible to recognise that there is a tendency for users of the same cluster (i.e. similar levels of usage) to have in common certain themes. For example, users from the 'high usage, high discretion' cluster are inclined to view the adoption process as the result of the combination of IT personnel technical skills and users' expression of needs. In addition, they would expect to make an active contribution to this process. As a complement to this, the process of assimilation has progressed beyond the preliminary phases of the learning process, centred around training, towards learning by applying IT to work related applications. In contrast to this, the 'low usage, low discretion' cluster, on the whole, view adoption as driven by CSG and technical personnel. Consequently, it is not surprising to find that these users tend to interact in a passive fashion with IT and are still disposed to perceive assimilation in terms of learning through formal training.

Division by Organisational Position:

Position	Inter-viewee	Origin of IT ideas	Organisational Perspective	Point of Assimilation	Interaction with IT
	B	Mix	Strategic	Task	Active
Senior and	**D**	Mix	Strategic	Task	Active
Middle	**F**	Mix	Strategic	Task	Active
Mngt.	**G**	Mix	Strategic	Training	Actv/Passv
	H	CSG	Strategic	Training	Passive
Lower	**A**	CSG	Operational	Training	Passive
Mngt and	**C**	CSG	Operational	Training	Passive
Secretarial	**E**	Mix	Strat/Oper	Task	Actv/Passv
	I	CSG	Operational	Training	Passive

Table 8.2 - Aggregate Themes By Position

Table 8.2 reclassifies the interviews into two groups so that they represent a division by organisational position. Not surprisingly, this suggests that senior and middle management share a strategic perspective and, as a result, appraise the adoption and assimilation of IT in terms of its wider organisational influences. By contrast, lower management and secretarial staff tend to see such developments from within the sphere of their own work activities. This scenario would appear to be the case despite an interviewee's level of IT usage. For example, interviewee H holds a strategic perspective whilst exhibiting all the signs of passive interaction with IT.

Senior and middle managers, on the whole, view the adoption process as a mix of user and CSG inputs, and their further assimilation of IT is oriented towards their work tasks. However, this is not the case for all senior and middle management, nor is the reverse entirely true for lower management.

It would appear that differences in the perception of the adoption and assimilation processes are better explained by reference to a user's level of usage, whilst perceptions of the organisational environment are more suitably understood through organisational position. It may be that as a user becomes more senior the nature of their work changes so that they have a greater disposition to participate in the application of IT.

Division by Organisational Section:

Analysis by organisational section revealed no significant distinction between individual users and as such is not considered of any relevance to this study. It may have been possible to identify 'organisational section' as an influence if considerably more interviews had been conducted.

8.4 Conclusions

The interview phase identified several commonly held beliefs about the organisation. Interviewees hold the view that the organisation is driven by a technical/engineering ethos. Furthermore, the interviewees were of the opinion that the organisation performs like a small company, is innovative, streamlined, flexible and responsive, but with the benefits that accrue from belonging to a larger multinational organisation. The individual employees within the organisation are seen as self-motivated. The organisation is seen as having a positive self-image. Together, these beliefs form an *organisational identity.*

Despite an identified lack of management communication amongst some interviewees the recognition of the importance of IT to the business was very evident. Key management figures champion IT and the organisation is prepared to invest in both technology and training programmes. The positive aspects of the organisational environment are seen as contributing to this. The only negative organisational factor was a pressure on time which hampers the use of IT. This is summarised in Figure 8.2.

Perceptions of how new IT ideas originate and develop fell into two distinct themes. Interviewees either see IT innovations as the result of IT staff activities, or as a mix of inputs from users and IT personnel. Further analysis suggests that this results from differences in user characteristics (see tables 8.1 and 8.2).

When considering the aspects which positively contribute to the adoption process interviewees identified a set of organisational attributes and an equally important set of IT staff attributes. The financial wealth of the company and its proactive stance vis-à-vis new technology is believed by users to put the company at the technology forefront. The small company status, which users afford their organisation, allows all resources, not just IT resources, to be focused effectively. This contributes to a responsive, *user aware* Computer Services Group (CSG) which, in turn, complements the organisational aspects previously mentioned.

Negative influences on the adoption process relate to 'user involvement' and the 'nature of change'. This is summarised in figure 8.3. What is interesting about the negative influences of the adoption process is that they do not appear to become detrimental until the assimilation process. Whether these are hindrances to the adoption process, rather than the assimilation process is debatable. However, it does stress how both processes are interrelated. Furthermore, it must be stressed that both 'adoption' and 'assimilation' are *processes*, both interacting and occurring simultaneously.

When both the positive and negative aspects of the adoption process were considered the interviewees were keen to stress the high level of user satisfaction. The only focus of dissatisfaction rests with the way the transition period was managed with some users not clear on why IT changes were taking place.

Three constraints to the assimilation process were identified. These were concerned with the availability of IT, the availability of time, and a lack of knowledge and understanding of the technology to allow or improve its utilisation.

A number of areas for improvement were highlighted. Some of these lie beyond the control of IT personnel, whilst others could be addressed within the framework of current operations. The availability of time was sighted as a reason why users fail to fully assimilate IT. Training was the most common focus of the issues that can be addressed by CSG. Figure 8.4 illustrates the full range of training improvements discussed by interviewees. The flexibility and responsiveness of CSG were seen as further areas for improvement. Of particular concern were the ability to adapt IT to match the different users' work environments, coupled with the desire to see a higher calibre troubleshooting and support facility. This correlates with the responsiveness and knowledgeability issues raised by the service quality questionnaire in Chapter 7.

Further analysis looked at the themes raised by individual interviewees and related these themes to the key attributes which arose from Chapter 7. The attributes reflected a user's level of IT usage, organisational position and organisation section. Cognitive mapping was employed as a means of representing each individuals flow of thinking. From both the individual maps (section 8.3.5) and the aggregate analysis (section 8.3.6) it was possible to build up an understanding of the different phases of user development.

Four themes emerge from the analysis. These represent *i)* the origin of ideas, *ii)* organisational perspective with respect to IT, *iii)* point of assimilation, and *iv)* degree of interaction with IT. Users from the 'high usage, high discretion' cluster are inclined to perceive the adoption process as a combination of IT professionals' skills and users' expression of needs. These users expect to make an active contribution to this process. Furthermore, the assimilation process has progressed beyond the initial phases of the learning process, centred around training, and moved towards learning by applying IT to work related applications. By contrast, the 'low usage, low discretion' cluster, on the whole, perceive that IT professionals are responsible for driving the adoption process. Given this, it is not surprising to find that these users have a tendency to interact in a passive fashion with IT and are still inclined to perceive assimilation in terms of learning through formal training. When the users are classified depending on their organisational position their perception of the role IT plays within the organisation changes. Senior and middle management users have in common a strategic perspective. Consequently, they seem able to appraise IT adoption and assimilation in terms of the wider organisational perspective. This vision is not apparent in lower management and secretarial staff, who perceive such developments from within the sphere of their own work activities.

8.5 Summary

This chapter has examined the IT professional - user relationship by exploring the values and perceptions of a group of users with regard to the IT adoption and assimilation process. The aim of this investigation was to build on the service delivery questionnaire covered in chapter seven, and to provide a richer understanding of the cultural context and organisational environment in which adoption and assimilation take place. This chapter forms part of the wider investigation into the receipt of IT services (see figure 3.1).

The design and use of the follow-on interview was discussed in section 8.2. This explains the justification for the approach taken, the generation of a suitable framework of questions, and the selection of interviewees. Section 8.2.4 describes the use of cognitive mapping to present the qualitative data provided by the interviewees. The analysis and results, described in section 8.3, discuss the users' perceptions of the organisational setting, the adoption process, and the assimilation process. Cognitive mapping is used to explore each individual interviewees' understanding of the relationships between adoption, assimilation and organisational setting. Section 8.3.6 explores the aggregate findings to look for any similarities and differences which may exist between different users.

CHAPTER NINE

Results, Conclusions and Implications

9.1 Introduction

The purpose of this final chapter is to present the conclusions from the research and to establish the contribution and implications.

The following section collates the findings from the various research activities (Chapters 4 to 8) and appraises them with regard to the issues developed in Chapter 2. In Sections 9.3 and 9.4 a model of the IT innovation process is presented. This explores the inter-relationships between the conceptual issues and elaborates on the IT Professional-User relationship with reference to the concept of congruence. Section 9.5 considers the contribution that this conceptual style of research makes, both to research of IT and to the broader debate on technology transfer and innovation. Finally, the limitations of the research approach are discussed and, in the light of these and the research conclusions, areas for further research are suggested (in Section 9.6).

9.2 Collation of Findings

The five research activities yielded numerous insights into the process of IT adoption and assimilation. Table 9.1 (overleaf) collates these findings and relates them to the main issues, developed in Chapter 2.

	Business & Information Technology Integration	Technical & Economic Perspectives	Congruence of IT Professionals with Organisational Management
Survey of IT Managers	IT professionals perceive organisational change in terms of technical change. Generally, IT planning addressed from a short term, economic perspective, rather than a long term strategic perspective. IT professionals unable to relate to user needs, unable to communicate in each other's language.	Major concern of IT professionals is the technology. Computing industry seen as the driving force. Attempt to keep up with technical change. Little or no concern for user or business needs. Personal satisfaction with technical issues alone. IT professionals tend to see themselves as technology controllers, rather than service providers.	IT professionals are seen to exercise expertise, resource and position power. They adopt a technocentric approach to their work and see their departments as autonomous from the rest of the business. They see the involvement of business managers as bureaucratic interference. They respond to externally driven change, rather than internally driven change.
Literature Perspective Study	Business ramifications frequently overlooked. Deterministic assumption that the technology will create positive business change. No understanding of the organisational consequences of technology introduction	Technical hype in the literature, little business realism. Technology portrayed as a panacea. Literature predominantly written by technical authors for technical audiences.	Reinforcement of the technical orientation of IT professionals. Over-emphasis on technical matters creates a gulf between IT professionals and organisational managers.
Survey of Job Specificat-ions	IT staff are not, on the whole, expected to relate to management and user positions. Focus of IT jobs is away from organisational concerns, and toward technical issues. Interaction with users is not rated as important. Limited strategic perspective required in senior IT positions.	Technical and economic issues are pervasive. Technical skills are made explicit. By contrast, there is a lack of user oriented skills requirements. The over-emphasis on the technical perspective leads IT professionals to focus on IT adoption and to neglect assimilation	Over emphasis on technical skills. Development of a professional ethos is continually reinforced by selection practice which compounds the situation. Lack of user focus generates conflict with other organisational members.

Table 9.1 - Collation of Findings from the Research Activities.

	Business & Information Technology Integration	Technical & Economic Perspectives	Congruence of IT Professionals with Organisational Management
Study of User Perceptions of Service Delivery	Users recognise the role technology plays and emphasise the importance of the organisational stance regarding technological change. Users highlighted the need to adapt IT to match their different work environments, and to recognise the heterogeneity of their work, technical application, training and support requirements.	Users value a number of different elements of IT support, apart from just the technological elements. These encompass reliability and competence of support personnel, responsiveness and access to the provided service, and the nature of the support interaction.	Users perceive that the receipt of IT services is hindered by a lack of user involvement. The process of IT adoption is hindered where the IT function dictates both the rate and nature of change. Users recognise the importance of IT assimilation, as distinct from the adoption emphasis common among IT professionals.
Follow On Interviews of Users.	Users perceive that their interactive involvement in the process of adoption and assimilation raises the quality of IT innovation and leads to enhanced business performance. A strategic perspective is evident amongst certain users (predominantly senior and middle managers) who are able to appraise IT adoption and assimilation in terms of the wider organisational perspective. However, this vision is not apparent in lower management and secretarial staff, who perceive adoption and assimilation from within the sphere of their own work activities.	Users recognise the importance of assimilation and emphasise the role of training (knowledge acquisition), and 'consolidation' (the practical application of that knowledge) following the adoption of new information technology. The users strong emphasis on the process of assimilation embodies a personal or individual perspective which is in marked contrast to IT professionals technical emphasis on adoption and delivery of the technical artefact.	The interviewees recognised a number of heterogenous user characteristics with regard to the level and nature of IT usage, skill and expertise (prior knowledge), and organisational position. These characteristics lead to markedly different support requirements. This is in direct contrast to the perceptions of IT professionals who view users as homogenous in terms of service provision.

Table 9.1 Continued - Collation of Findings from the Research Activities.

In the following section the knowledge summarised in this table is utilised to generate a symbolic model which can be used to explore the complexity and richness found when using this research approach.

9.3 From the Collation to a Model of the IT Innovation Process

This section attempts to understand the material, which is summarised and collated in Section 9.2, with respect to the main themes and issues of this thesis, as discussed in Chapter 1 and developed in Chapter 2. The following symbolic diagram explores the main themes with particular reference to the skeletal framework proposed in Section 2.5.

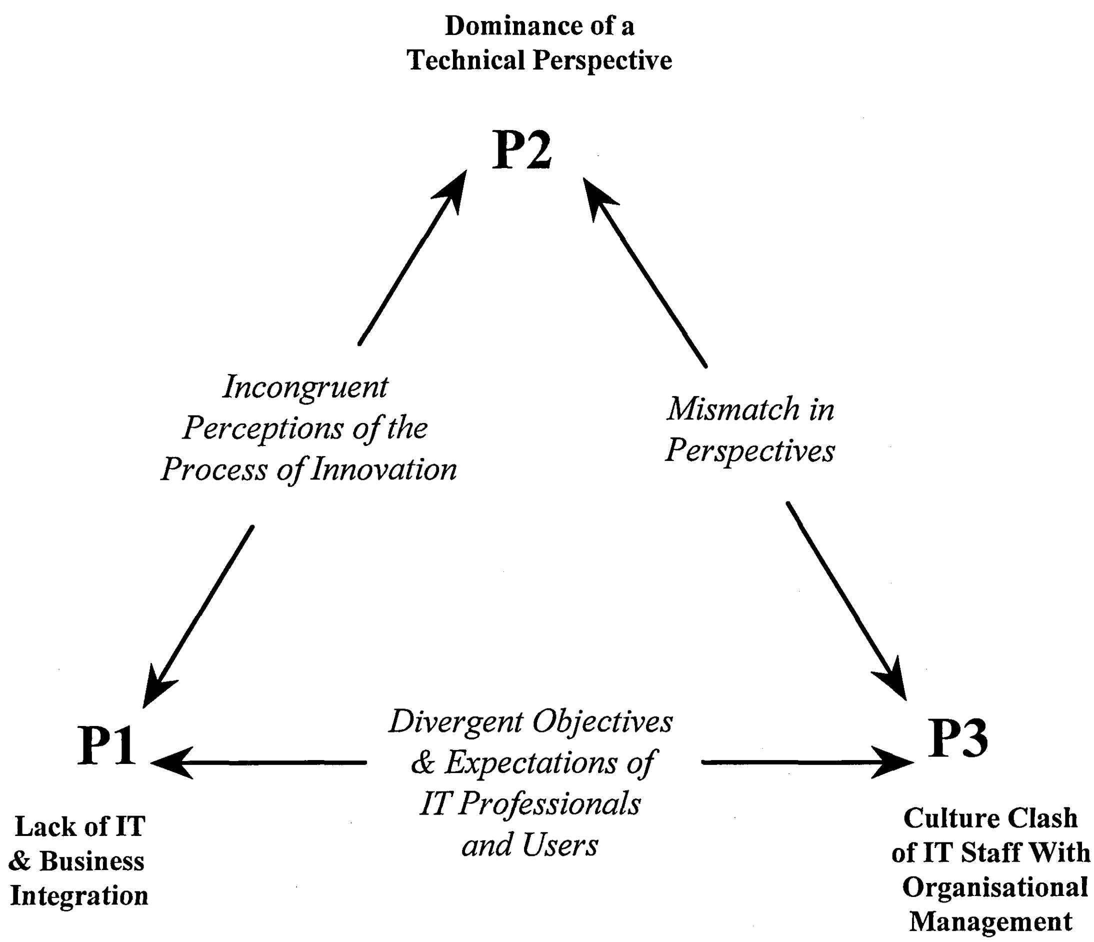


Figure 9.1 - Model of the Main Themes

The way in which this is done is that the propositions (developed in Chapter 2) can be thought of as forming the nodes of the triangle, whilst the research activities provide the detail and complexity about the interactions between these. In the following section each of the three interactions is exposed with reference to the table in Section 9.2. In doing this, a link is made from the conceptual to the real world.

9.4 Substantive Findings

9.4.1 Developing the Model

This section attempts to understand the relationships between the issues, defined in Chapter 2, in the light of the findings of the research activities summarised in Table 9.1. The following figures locate these findings on the model presented in Section 9.3. Figures 9.2 and 9.3 relate the findings from the three studies of the delivery of IT services, whilst figure 9.4 is informed by the two studies of IT service receipt.

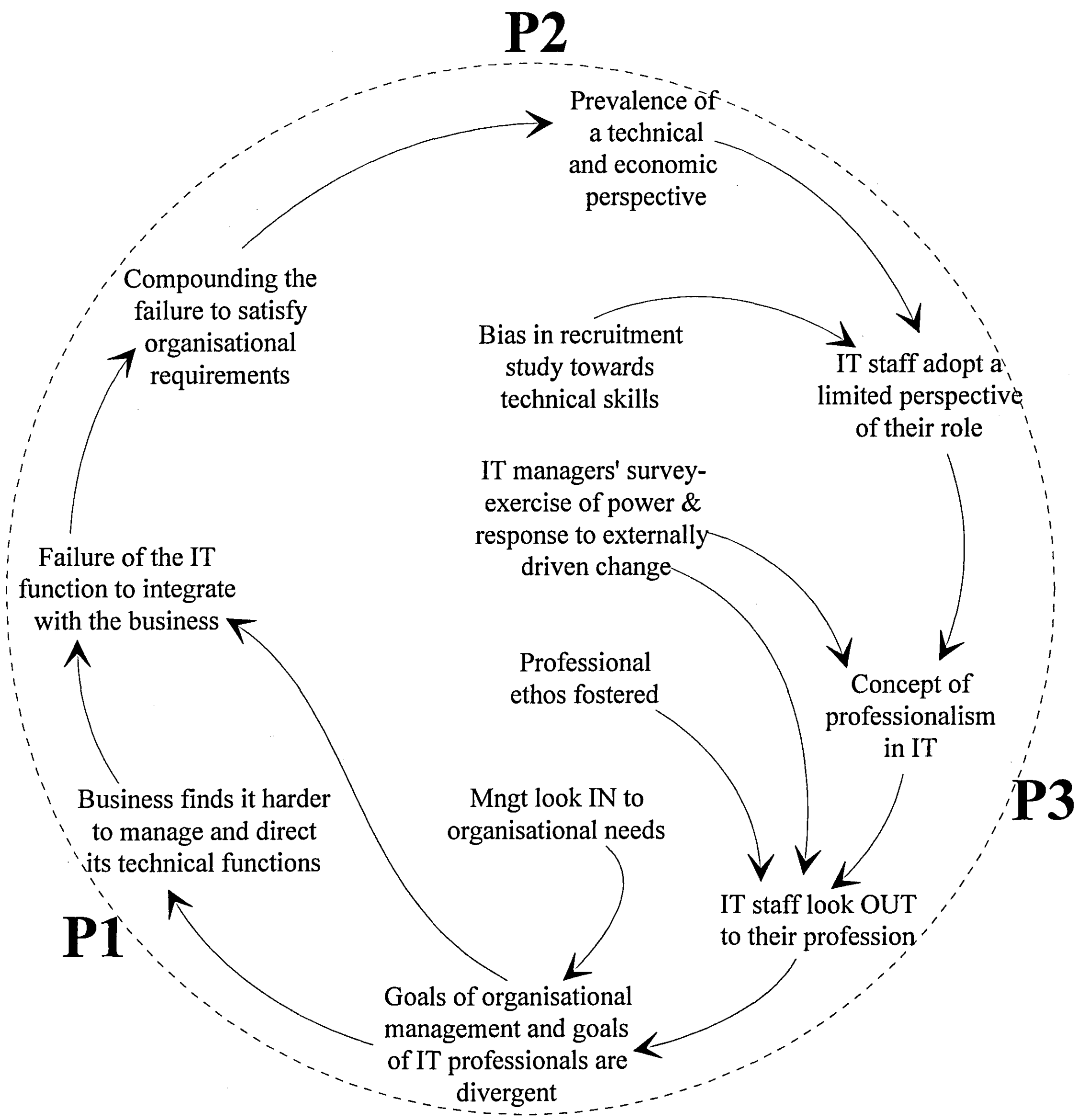


Figure 9.2 -
The Relationships Between the Three Issues for Service Deliverers (Clockwise)

The relationships between issues are first shown as a set of clockwise connections (figure 9.2) and then as a set of anti-clockwise connections (figure 9.3). This was done to demonstrate the relationships more clearly. However, it should be stressed that in reality both processes occur simultaneously.

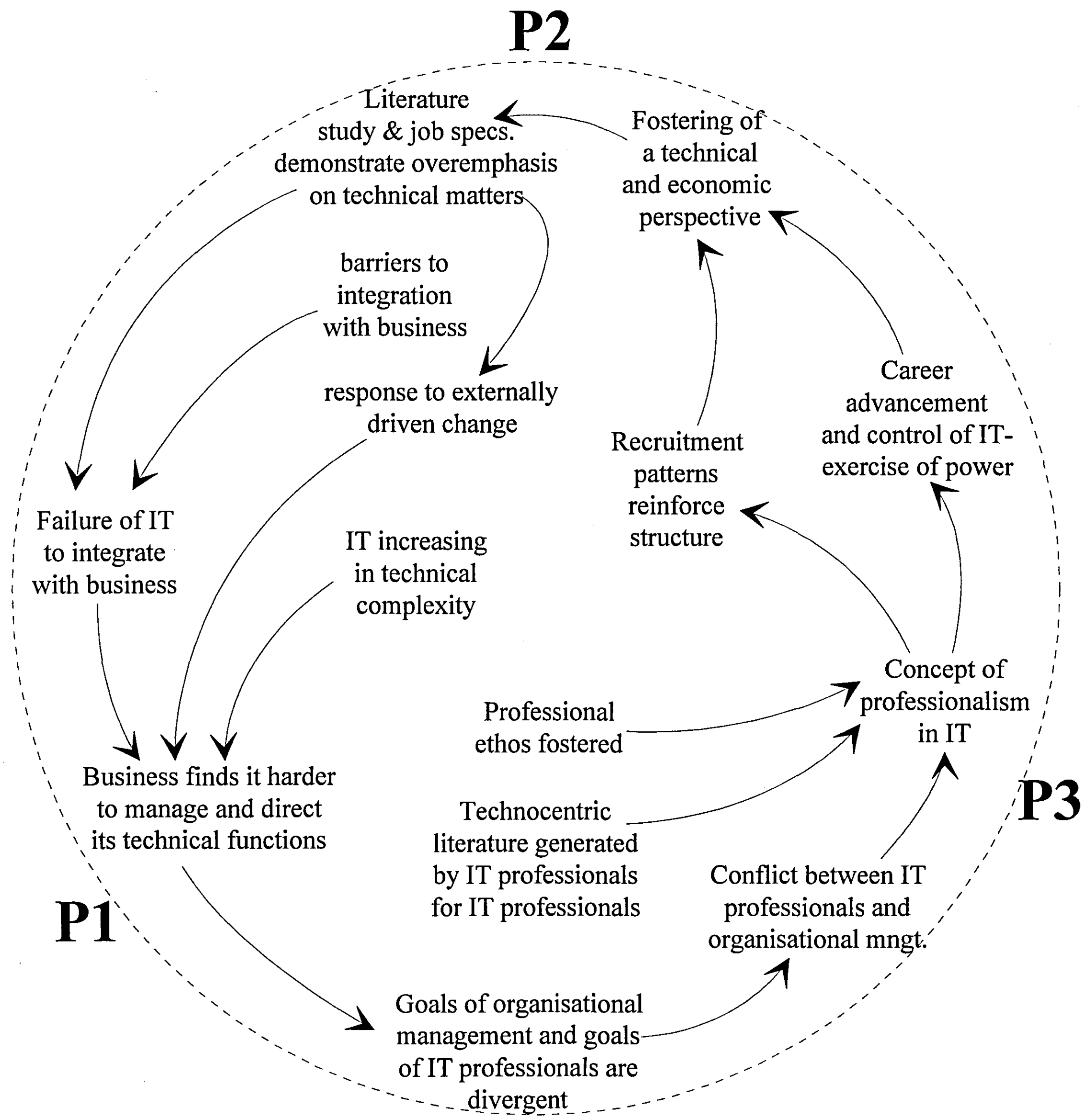


Figure 9.3 -
The Relationships Between the Three Issues for Service Deliverers (Anti-clockwise)

Figures 9.2 and 9.3 demonstrate how the three main issues of the thesis are interrelated. It is also important to recognise how each of the issues reinforces and feeds the others. This is seen as very much a cyclical process, which implies that the issues are, to some degree, self-perpetuating. For example, the dominance of a technical perspective leads to a failure to integrate IT with business and reinforces a technically oriented role amongst the IT profession. This, in turn, has ramifications for the other relationships. Similar observations may be made for figure 9.4, that there is a strong relationship between the main issues and this relationship is self-perpetuating.

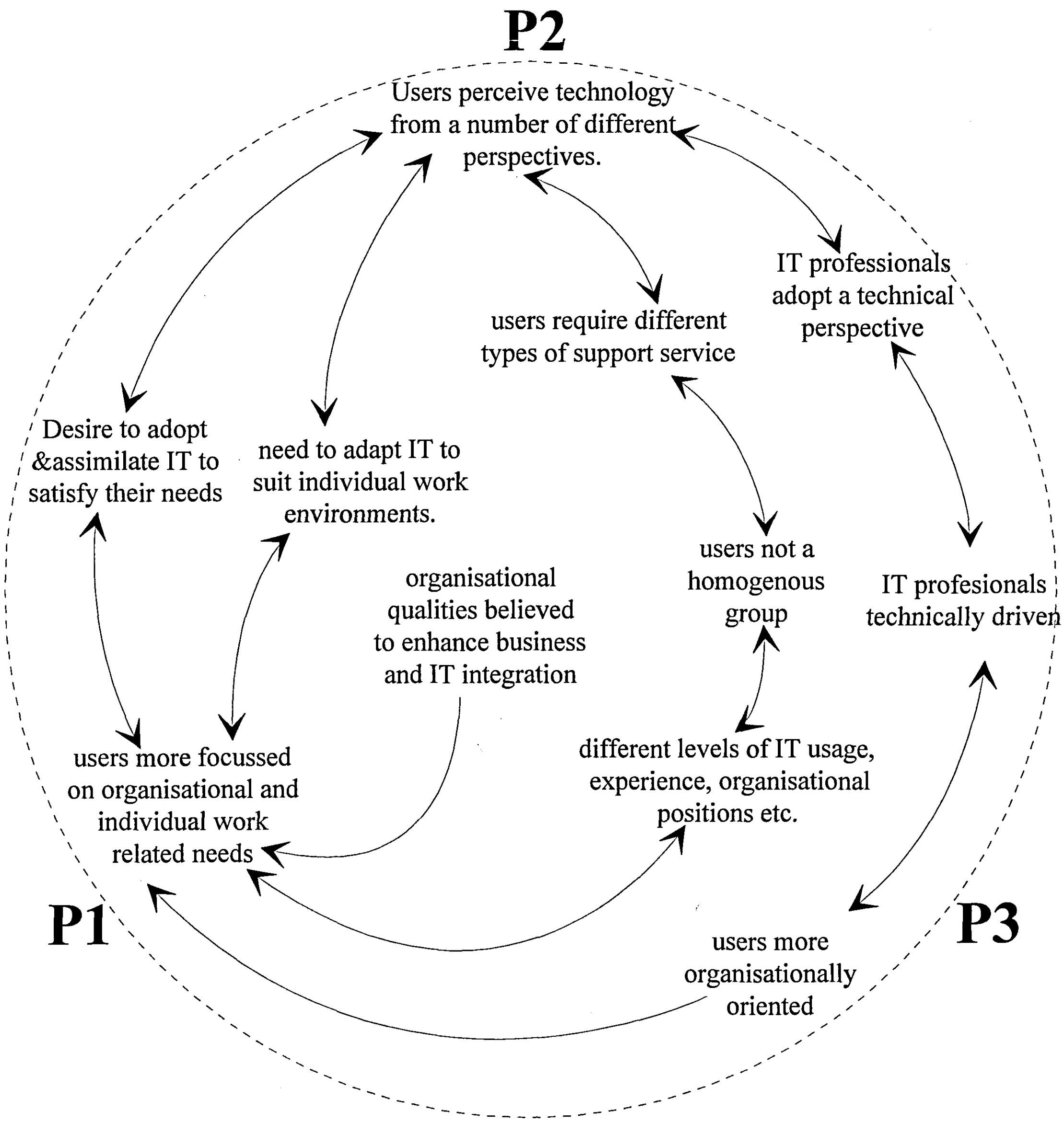


Figure 9.4 -
The Relationship Between the Three Issues for the Service Receivers

Together, these three figures develop a process model of IT innovation, which builds on the symbolic relationship of the main themes (figure 9.1), and which stresses the relationships between IT Professionals, Users, and the Organisation.

9.4.2 Understanding the Nature of Incongruence

The overall conclusions to the five research activities (discussed in Table 9.1) suggest that there is a mismatch between the delivery of IT services and the receipt of IT services. A is further suggested that the perspectives which IT professionals and users bring to the process of IT adoption and assimilation are substantially different. Hence, the purpose of this section is to explore in-depth the *nature* of this incongruence.

The Mismatch in Perspectives

The major concerns of IT professionals have been shown to rest with technologically focused issues. In addition, the majority of IT professionals questioned gained personal satisfaction from the technical components of their work, without redress to other potential components. IT professionals also have a tendency to perceive themselves as technology controllers, rather than service providers. This tendency spans a wide variety of IT professional job types. This is reinforced by both recruitment practices and the current literature. Consequently, the approach taken by IT professionals to the adoption and assimilation of IT is predominantly from a technical perspective.

By contrast, users perceive the IT support services from a number of different perspectives. In addition, it is the intangible considerations, which users perceived as being more important than the technology alone. Accordingly, the overall perspective which users hold draws on the amalgamation of a variety of different perceptions.

What is clear from this is that fundamental differences exist between both IT professional and user perspectives of the process of IT adoption and assimilation. This mismatch can only create a divergence in understanding between the two parties.

The Process of Technical Change

There is a strong tendency amongst IT professionals to perceive technical change as a linear process. More specifically, the process is viewed as uni-directional, with change perceived as technology driven. New IT developments are believed to occur as the product of computing industry activity. Accordingly, it is perceived that it is an IT department's responsibility or organisational role to react to such developments and to transfer them to the users. Figure 9.5 illustrates this, with the arrows representing the flow of technical change.

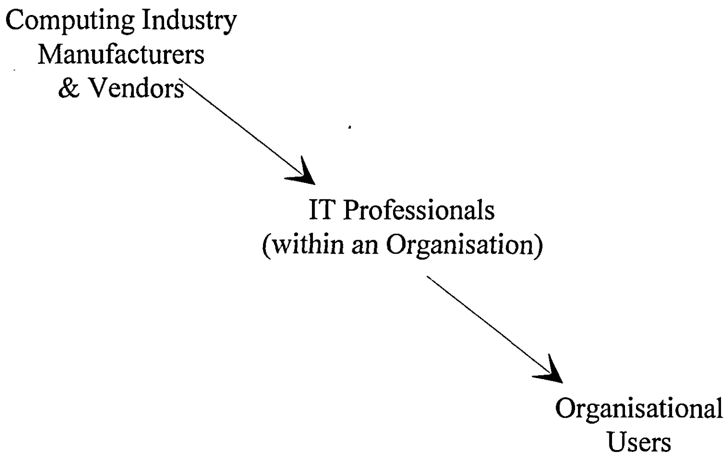


Figure 9.5 -IT Service Provider Perceptions of Technical Change

By contrast, users perceive technical change as arising from the interaction of users and IT professionals in response to a mixture of business needs, user needs and technology developments. Technical change emerges from a multi-directional interaction between IT professionals and users in an attempt to satisfy need (see Figure 9.6). In certain cases this perception represents user beliefs of how technical change *should* occur, rather than their experiences in reality.

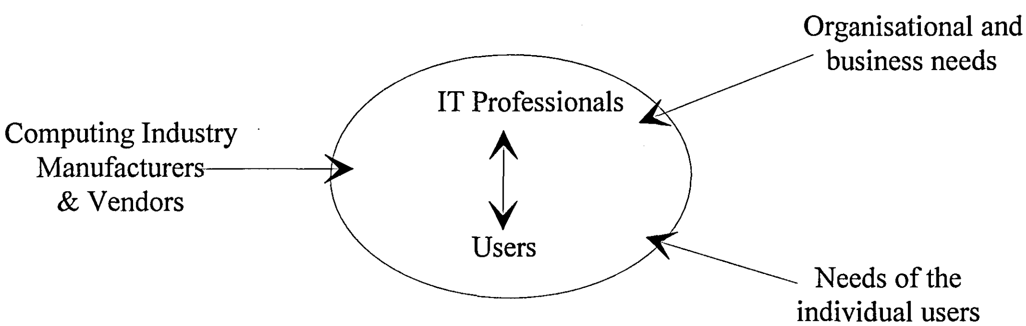


Figure 9.6 - IT Service Receiver Perceptions of Technical Change

Understanding the Process of Technology Adoption and Assimilation

In addition to the incongruences already described, IT service deliverers and service receivers differ in their understanding of the process of technology adoption and assimilation. Put simply, IT professionals place emphasis on IT adoption, whilst users' emphasis rests more with the assimilation process.

What emerged from the research findings is that users emphasise the need for access to the knowledge of IT professionals. This access appears in three forms, which enable the transfer of knowledge. Firstly, it is necessary to be able to obtain IT professional attention whenever necessary (emphasised through the need for a prompt response). Secondly, when this attention has been gained it is important that IT professionals are competent, i.e., they have the required knowledge in sufficient depth. Thirdly, emphasis is placed on the way in which this knowledge is transferred, i.e., it is seen as beneficial if IT professionals have some understanding and empathy for the users and their work roles. Accordingly, user understanding of the process of adoption and assimilation places specific emphasis on their own knowledge acquisition in order to apply the technology to greater levels of satisfaction. As a result, particular focus is given to the issue of training and the changing nature of training requirements to match the evolution of individual user skills. Users also recognise that the nature of their work, a lack of available time, and their existing knowledge may all act as inhibitors to assimilation.

By contrast, IT professionals fail to recognise the user element as part of the adoption and assimilation process. The over-emphasis on the technology and the perception that change is a product of technical change alone, fosters the belief that adoption and assimilation ends with technology installation. Consequently, the assimilation issues important to users are never truly addressed and a superficial approach is taken to support activities. The apparent relegation of the learning elements of IT support services suggests that the level of assimilation may never proceed beyond a certain point in the majority of organisations. This 'glass ceiling' means that whilst the technological sophistication of IT increases, the innovative application does not.

Recognising the Importance of User Characteristics

The research activities in this thesis suggest that service deliverers fail to attach any relevance to the different characteristics which exist between users, However, the users themselves acknowledge that different characteristics alter the nature of IT service receipt. Several characteristics emerged from the studies of the service receivers. These include variations in users' overall usage, discretionary usage, skill and expertise, and organisational position.

In part, this lack of congruence is the logical extension of the mismatch in perspectives and the understanding of adoption and assimilation, discussed earlier in this section. IT professionals approach adoption and assimilation from a predominantly technical perspective and place far greater emphasis on the process of adoption, rather than assimilation. Once such a position has been adopted, any understanding of the influence user characteristics may have becomes minimal. Consequently, IT professionals perceive users as a homogenous group.

The users, on the other hand, hold a number of different perspectives, with regard to IT service delivery, and place a greater importance on assimilation. From this position, users recognise that they require alternative types of service. This is to suit the range of characteristics specific to each individual user. Accordingly, there is a need to adapt or tailor the technology to the individual, and in so doing, change the nature of the service delivered so that it matches a user's knowledge and learning requirements. Accordingly, there is a need for a responsive IT function which changes its approach to support depending on the recipient. This is in direct contrast to the homogenous view of users, as perceived by IT professionals.

9.5 Implications for Change

This thesis has stressed the fact that the process of IT adoption and assimilation needs to be solved at an *organisational level* if these broader relationships are to be satisfactorily addressed. This implies that organisations should find a better *balance* between their organisational processes and current approaches to IT innovation. As a consequence of this, the following range of issues highlight specific areas which need to be taken into account across the organisation.

i) Integrated business strategy and IT strategy.

The integration of business strategy and IT strategy needs to be addressed at an organisational level in order to facilitate successful adoption and assimilation of IT. Only when an overall perspective is taken will the alignment of business strategy and IT strategy truly begin to take place. Indeed, the fact that business and IT strategies are generally perceived as separate entities only serves to reinforce the need for consideration at an organisational level.

Many writers on IT strategy assume that managers have at their disposal a rational framework for strategy formulation (Currie, 1994). Equally, it is misleading to view organisational decision making as a rational or formal process undertaken by a homogenous social and political group. However, many researchers offer prescribed ways of how to combine or align IT and business strategies which fail to comprehend the different organisational processes taking place or the different perspectives of interested parties, like, for example, senior managers, IT professionals and other functional groupings (Scarbrough & Corbett, 1992; Galliers, 1991). The conclusions to this thesis would suggest that it is more appropriate to approach the issue of strategy formulation from an organisational level, using a conceptual framework which allows for the assessment of a) the different, and naturally subjective, perspectives of a variety of organisational actors and b) the emergence of strategy from the ongoing processes and dynamics of an organisation.

ii) Reshaping the culture and outlook of IT professionals.

Some of the conclusions of this thesis have called into question the recruitment and training of IT professionals. The three studies of the delivery of IT services (Chapters 4 to 6) highlighted an over-emphasis on the technology component amongst IT professionals. Of particular concern has been the IT personnel who are responsible for providing interaction and support for the users. Chapters 7 and 8 demonstrated that there is a clear need for IT professionals to be able to relate to a variety of non-technical considerations, at an organisational level and at an individual user level. At present, the role of IT professionals is clearly defined in technical terms, but the non-technical elements appear to be left to chance. Furthermore, the need to overcome the communication barrier with users implies that specific concern should be addressed to the non-routine interactions and communications which take place between IT service providers and receivers.

iii) Recognising and Understanding user needs.

The successful assimilation of IT by users demands that the organisation at large has the capability to recognise and comprehend user needs. This implies that a variety of processes and/or mechanisms are required for identifying user needs and perceptions, and for eliciting their involvement in the design and specification of the information technology environment in which they work. Ideally, such processes should have the capacity to reflect the different stages of IT assimilation attained by different users and allocate alternative approaches to training and support accordingly. Lawless and Price (1992) suggest that IT professionals need to adopt an 'Agency Perspective'. They offer a reinterpretation of the traditional technology champion in which the IT professional acts as an agent of potential technology users, translating business needs into technological requirements..

iv) Fostering cumulative learning in organisations

The issues described above are more likely to be addressed in organisations that have a 'change acceptance' culture and are consciously striving to manage change effectively. Effective IT assimilation, and the requisite transfer of knowledge, are best encouraged within an organisational environment which fosters learning and endeavours to build on the cumulative knowledge already present. Cohen and Leventhal (1990) refer to this as 'Absorptive Capacity'; the innovative capability of an organisation, borne out of its ability to exploit the cumulative knowledge of its individual members. Similarly, Trott (1993) describes the elements which constitute the 'right' organisational environment, as crucial to the assimilation of new knowledge. However, the degree to which an organisation may assimilate technical understanding is intangible, and the benefits which may arise from IT innovation are difficult to detect. This suggests that it may be appropriate to find other ways of measuring business performance (Eccles, 1991).

Technique and Research Design Issues

The research has furthered our understanding of the process of technology adoption and assimilation through the values and perceptions of IT Professionals and technology users. In addition, it has recast the way of perceiving the problem, as the previous section has emphasised. However, as with all research, it has limitations.

The need to ascertain, in this thesis, the values, beliefs and perceptions of both IT professionals and users, as central to adoption and assimilation, had ramifications for the nature of the data to be collected. The types of information required comprised both a formal and qualitative dimension (see Section 3.3). The need to incorporate both forms placed certain constraints on questionnaire design. There is justified criticism, and competing schools of thought, of the use of quantitative and qualitative approaches to the study of complex organisational problems. It is believed that the fusion of both has been of benefit to this research.

Chapter 4 describes the survey of IT managers. The need to question a significant number of respondents, given the time and financial constraints, predetermined the choice of method. Consequently, the most appropriate course of action was to undertake a postal questionnaire. Whilst this approach generated an appropriate sample, it did, however, inhibit any follow up questioning of respondents to investigate new lines of enquiry resulting from the questionnaire. The target list of IT managers only comprised companies above a certain size. This meant that small companies, who may have reflected differently on some of the questions, could not be successfully contacted.

Similar constraints existed for the study of users described in Chapter 7. Again, the need to obtain a satisfactory response rate limited the application of the questionnaire to just two organisations. The limit on the number of organisations was influenced by the need to survey users who shared the same IT service delivery context and where the researcher was able to ascertain the organisational environment in which the process of adoption and assimilation occurred. However, because the users were located together it was possible to conduct further investigations, in Chapter 8. By only conducting the full user survey in one organisation, questions may be raised as to the generalisability of the findings. This needs to be overcome by replicating the study in various contexts, which explore different industrial sectors and IT service environments. It should be noted that problems of access to the second organisation made it difficult to assess adequately the organisational context, to the researcher's satisfaction. Consequently, it was considered more appropriate to place the findings in an appendix (Appendix G).

9.6 IT and Technology Innovation Research

9.6.1 Technology Innovation Research

In section 1.3, Seaton and Cordey-Hayes (1992) identify three weaknesses with current approaches to understanding the process of technological innovation. To recap, these were concerned with:

1. The inability to address issues of a social, organisational, or user nature,
2. The failure to recognise the importance of the process of interaction between various parties to technology assimilation,
3. The incongruence between (articulated) business needs and the technology solution.

Central to all of these issues is the important distinction between variance approaches to innovation and process-oriented approaches. Variance approaches attempt to identify the critical factors which are believed to create successful innovation, without explaining how such an outcome will occur. By contrast, Seaton & Cordey-Hayes (1993) highlight the need to view the adoption of technology as a process, and note that:

> *"innovation seldom involves a simple one-off transaction but is a process or dialogue between a variety of actors in the two parties and involves a continuing relationship to the point where real benefit accrues to the recipient"* (Seaton & Cordey-Hayes, 1993).

In a similar vein, Markus and Robey (1988) demonstrate the weaknesses of both technological and organisational imperatives and suggest that process models provide a useful way of understanding the 'dynamic interplay among actors, context and technology', which they term the emergent perspective.

Few studies of innovation have clearly focused on understanding the processes which may transform an initial set of conditions into outcomes. In Chapters 1 and 2 of this thesis a conceptual approach is developed which considers the process-related elements of innovation and technology transfer. This recognised a number of organisational and individual elements of technological innovation, as well as the technical features. Central to this is understanding the significance of the technology user-technology professional relationship, if real and on-going improvements in business performance are to occur. As Newman and Robey (1992) observe, this relationship is very infrequently addressed and would appear to have been overlooked as a fundamental part of the innovation process.

With specific reference to information technology (IT), Section 1.4 described how current approaches to its management fail to take account of the wider issues which influence the process of innovation. With this in mind, the concepts of *adoption* and *assimilation* are developed in Chapter 1. To reiterate, adoption describes the initial processes of identifying, acquiring, then implementing an IT innovation. Whereas, assimilation describes the processes of IT innovation following the process of adoption, and encompasses the ability and willingness of individuals to absorb technology into their work tasks and roles. The concepts of adoption and assimilation, in conjunction with the overall conceptual approach, were examined in the context of IT. As a way of enabling the research design to focus, as a set of IT related issues are derived which form an important element of the conceptual approach. These issues focused on the lack of business and IT integration, the dominance of a technical and economic perspective amongst IT providers, and a marked difference in cultures and outlook between IT professionals and other organisational managers. This served as a means of enquiry into the wider issues associated with technology adoption and assimilation. In addition, this meant that some of the weaknesses, mentioned above, could be overcome.

A further benefit of this approach was that it was possible to address the relationships *between* the issues. In the light of the research activities, Sections 9.3 and 9.4 articulate a model of the *process* of IT innovation which encapsulates a number of these interactions.

The use of the conceptual approach has enabled a significant improvement to be made to the understanding of the process of IT adoption and assimilation by demonstrating how different issues are interrelated. It also describes how the factors and processes underlying each issue reinforce and feed the others, creating the possibility of progressive decline. This suggests that assimilation is a cumulative learning experience, requiring improvements in a number of different, but complementary areas. Such understanding is overlooked by existing information systems research, which tends to concentrate on single issues and so miss the broader relationships. One notable exception to this is the work of Walsham (1993) who talks of 'constitutive processes' which consider the social processes of IT initiation, development and use in an organisation as 'being carried out by human actors in a knowledgeable and reflexive way within social contexts which are constituted by previous and present social actions'.

In order to facilitate enquiry into the issues raised above, it was considered appropriate to make use of a number of conceptual devices from the fields of Innovation and Technology Transfer. These were then applied to the field of IT. Using such conceptual devices, as multiple perspectives, congruence and service delivery, it is possible to move beyond the weaknesses identified by Seaton and Cordey-Hayes (1993) and offer useful approaches in the pursuit of technology adoption and assimilation. It is beneficial to consider the contribution each of these has made to our understanding.

This thesis has made extensive use of the concept of multiple perspectives, originally developed by Linstone (1981, 1984). In recognising that a technical perspective alone is not adequate to describe the process of technology adoption and assimilation, its application has provided a way of taking into account a variety of organisational and individual (or user) issues.

Through the use of multiple perspectives it is possible to study the human, as well as technical, elements of technology adoption. Furthermore, this concept has made it possible for this research to gain valuable insights into the way both organisational and individual perspectives *interact* with technology, and thus providing an alternative conceptualisation to linear models of innovation. Specifically, Section 9.4 demonstrated how multiple perspectives has aided in the understanding of how these human elements may facilitate or hinder technology adoption. In addition, it is clearer how the different phases of user development effect the nature and degree of technology assimilation, as part of the innovation process, rather than just as a set of 'static' factors. The notion of looking at any problem from different perspectives is, despite its simplicity, a powerful framework. By the same token, exploring these interactions would not have been possible from a study bounded by a single perspective.

By using the ideas of 'process', as mentioned previously, the exploration of the values and perceptions of IT professionals and users was made viable. The concept of congruence (Nadler & Tushmann, 1988) was considered particularly appropriate to this because it provided a means of understanding the degree of consistency (and inconsistency) between the perceptions of the various parties studied. The application of the concept of congruence has proved to be a particularly powerful device for understanding the *interactions* which take place during the innovation process.

In Section 9.4 several areas of incongruence are identified and explored, with respect to IT. Current studies recognise, either implicitly or explicitly, the mismatch between IT service providers and receivers, but fail to comprehend the form or nature of the incongruence (*see for example* Newman & Robey, 1992; Kumar & Bjorn-Anderson, 1990; Newman & Rosenberg, 1985; Markus, 1984). Consequently, existing responses are simplistic and only attempt to cure the symptoms without understanding the causes. Having identified why there is a lack of congruence, it becomes viable to explore the consequences of this, and only once an understanding of the *nature* of incongruence has been established, is it possible to propose solutions which address these causes. It is further suggested that any action taken to remedy the situation must involve organisational issues which span various activities and, therefore, need to be addressed from an organisational level.

This thesis utilised the concept of service delivery as a means of better understanding the values and perceptions which users hold with regard to the delivery and receipt of

IT services. The use of service delivery concepts, with its focus on the intangible elements as well as the tangible, has meant that it is viable to conduct a broader service focused study, rather than a limited technology focused study. This has made the research receptive to a host of organisational and individual issues.

In addition, application to a real world scenario has made it possible to gain important insights into how users conceptualise and evaluate the service they receive from the technical function. This has allowed the researcher to make a constructive comparison with the conceptualisation and service emphasis made by technology professionals, as service deliverers. The application of service delivery concepts has contributed to our understanding of the process of interaction between various parties during technology assimilation. This has also made it possible to understand how users perceive 'service', rather than the technical artefact, which mirrors the distinction between adoption, with its emphasis on technology acquisition, and assimilation, with its emphasis on absorbing technology into working roles.

9.6.2 Critique of the Conceptual Approach

This section critically examines the problems of using the conceptual approach and suggests ways of addressing these problems.

A major criticism of the approach taken in this thesis is that, whilst it produces a richness and depth to the findings, it does require multiple, or more complex, studies to be undertaken. In addition, the combination of several studies is potentially problematic.

The distinction between adoption and assimilation (as defined in Chapter 1) has proved to be particularly fruitful. This tends to suggest that there is particular worth in attempting to study the *process* of technology transfer, as this reveals insights which are difficult to obtain by 'conventional' or more mainstream approaches. However, the study of process should not be seen as replacing other approaches, but rather as complementing them. Viewing assimilation as distinct from adoption suggests that there is a need to focus on the processes innovation which follow the acquisition of a technology. Furthermore, this research suggests that specific attention is given to the role of the individual in this process. This encompasses the way in which learning takes place both individually and with respect to the rest of the organisation. This is supported by Trott (1993) who suggests that there is a need for organisations to understand how individuals become aware of technical possibilities, how these are communicated with others, and what the nature of the organisational role should be. All of these considerations seem to imply that a longitudinal approach, capable of following an innovation process over time, may be more suited to such an investigation. This may have the added benefit of concentrating the research activity within the framework of a single study.

9.6.3 Further Research

A number of areas for further research have emerged as the result of the findings and limitations experienced in this thesis. This section suggests how best to build on these findings,

Further research needs to be conducted to relate the study of information technology to more mainstream approaches to technical change. An in-depth study of an organisation that has successfully achieved technical change, in a field wider than IT, may be appropriate. It is believed that lessons may be learned from more general technology research which are applicable to IT. In conjunction with this, better understanding needs to be gained of the organisational cultures and contexts in which most technical change takes place. The organisational situation has been observed as an influence on technology adoption and assimilation and should, therefore, be a central theme of further research. It is not clear how such research should be undertaken. However, it is believed that studying IT assimilation from the wider perspectives of technology transfer and organisational theory, rather than from within the confines of the current IT literature, will reveal a greater depth of understanding.

Investigating the Process of Assimilation

The findings, collated in section 9.2, have raised as many questions as they have answered. It is apparent that the issue of how users assimilate information technology is of paramount importance if greater organisational benefits are to be realised. Similar observations have been made by Trott (1993).

Further research is required in order to comprehend how users accumulate and absorb technical knowledge and understanding. A critical dimension of this focuses on the need to investigate how the user learning process changes over time and, consequently, how learning requirements change as the users' knowledge matures. Particular attention needs to be addressed at identifying the stage at which user learning moves from the acquisition of basic IT skills into the self-realisation of the applicability of these skills to their own, specific work. Only once our understanding of how users assimilate technology has been expanded is it possible to begin to determine what support, if any, organisations could provide to foster or facilitate learning.

Further Application of the Concept of Congruence to Process Oriented Research

There is a need to look in greater detail at *how* the values and perceptions uncovered in this thesis influence, or are influenced by, the process of IT adoption and assimilation. This would require a combination of two approaches. In essence, this would involve studying the encounters and episodes which take place between IT professionals and users over a period of time, as suggested by Newman and Robey (1992). It is believed that such a study would be markedly enhanced if it was conducted with respect to the values and perceptions which both parties bring to the process of adoption and assimilation, identified in this thesis. The lack of congruence, described in section 9.4, may shed valuable light on the way in which IT professionals and users approach each encounter.

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APPENDICES

Appendix A - Hardware and Software Expenditure
Appendix B - Attribute Set for Questionnnaire Development
Appendix C - IT Managers' Questionnaire
Appendix D - IT Managers' Questionnaire (Notes on Coding)
Appendix E - IT Managers' Responses to Question 8
Appendix F - Service Delivery Questionnaire (User Survey)
Appendix G - Financial Services Organisation - Service Delivery and Quality Questionnaire Analysis and Results
Appendix H - Framework for Follow-Up Interview Questions
Appendix I - Data References for Chapter Five

APPENDIX A

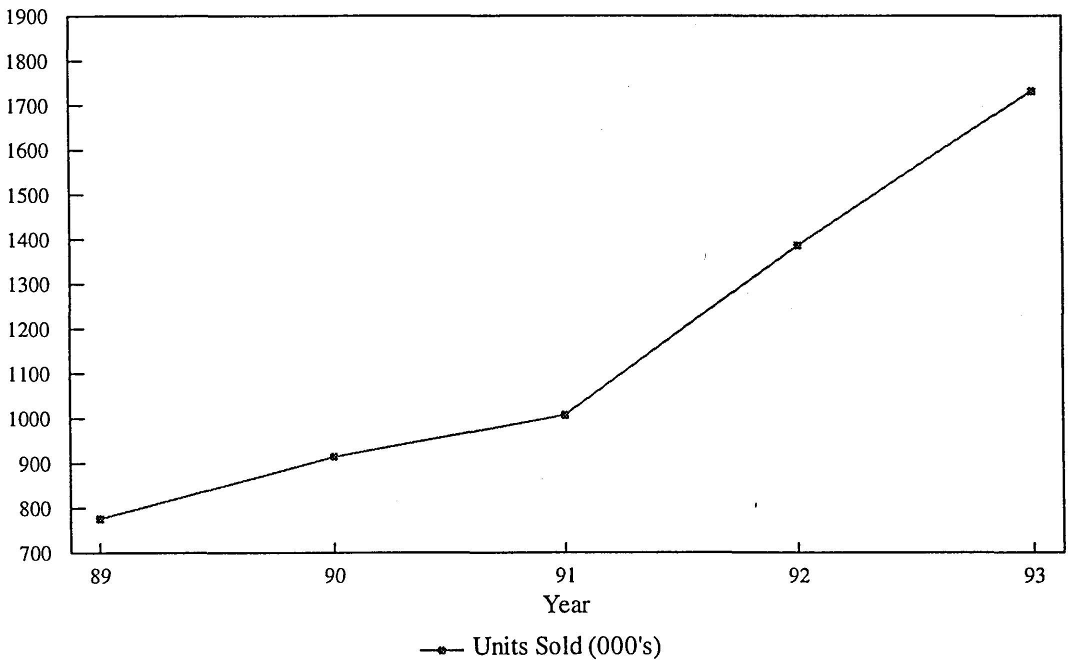
Hardware and Software Expenditure

Hardware : UK Personal Computer (hardware) Market

year	Units Sold (000)	sales value £million	Change on Previous Year
1989	776	1,219	n/a
1990	912	1,479	17%
1991	1006	1,442	10%
1992	1387	1,373	36%
1993	1732	1,500	25%

These figures include total sales for all types of PC (including laptops) for each year.

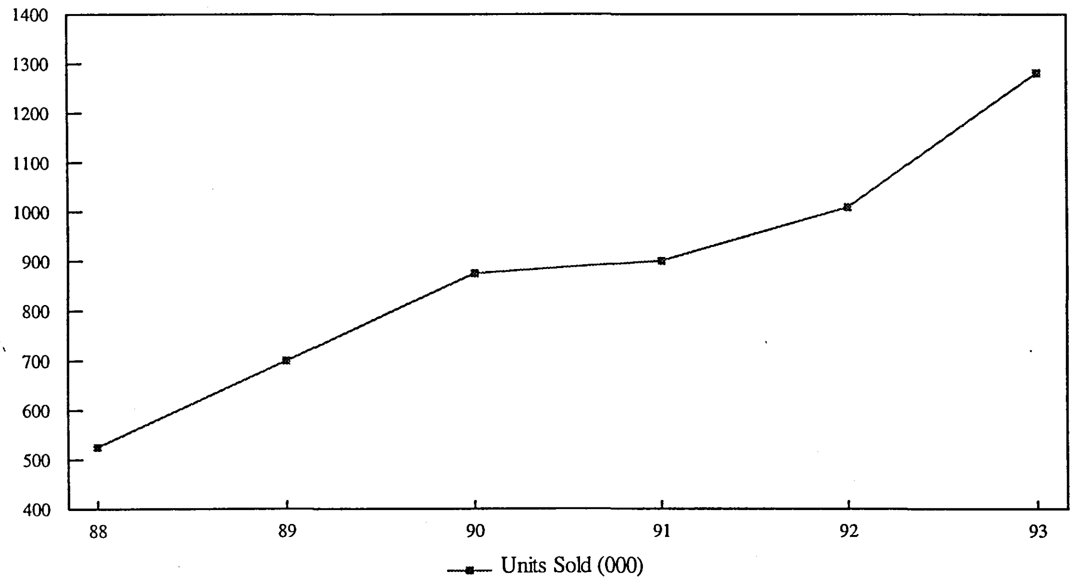
Prices of PCs have fallen between 25-40% over the last 2 years, causing a serious weakening of value sales. Overcrowding in the market place has led to sharp price reductions. In recent years sales have been boosted by the advent of direct sales channels, straight from vendor to buyer. These factors have combined to stimulate rapid technological innovation. The relative compatibility of information technologies makes rapid substitution more likely.



Software

UK Personal Computer Packaged Software Market

year	Units Sold (000)	sales value £million	Change on Previous Year
1988	525	170	-
1989	700	200	18%
1990	875	217	08%
1991	900	237	09%
1992	1010	280	18%
1993	1280	337	20%



Based on current estimates, Mintel estimate that the PC software market will grow by 141% between 1992 and 1997.

Estimated Cost of Piracy in the UK

	1988	1990	1992
Revenue loss to piracy £M	324	405	273

The world's leading software houses estimate that unauthorised copying of their programs costs them about 1.7 billion dollars a year throughout Europe.

APPENDIX B

Attribute	Expected	Desired
1) View of User	• as a problem	• as a customer
2) View of Self	• technology controller	• service provider
3) View of Control	• professional reference points	• super ordinates and end users
4) Job Analysis	• enjoyment of all things technical	• enjoyment of meeting organisational needs
5) Education/Experience	• only technical and economic perspective	• organisational and human influences in addition to technical
6) View of 'Success'	• professional standards and technical terminology	• organisational and user needs satisfaction
7) View of Own Dept.	• control by dictate	• user needs as IT support function stimulus

Note: The use of the 'expected' column heading refers to what is currently taken as the norm for IT function characteristics, 'desired' refers to a shift in actions and perceptions to satisfy (and share) an organisational and user perspective.

Each proposition can be investigated using a combination of attributes. By realigning the emphasis of each attribute in turn it is possible to relate the findings to each proposition. For example, attributes 3 and 6 apply specifically to the third proposition but are less revealing when applied to, say, the first proposition.

Derivation of the Questionnaire

The guiding principle for the selection of questions is that each question will, either individually or as a set of responses, provide further insight into each attribute (described above).

The following table shows which question(s) explain a particular attribute. Three degrees of influence are used.

Attribute	Question directly addresses attribute	Question contributes to attribute	Question provides supplemental evidence
1) View of User	6, 10		2, 5
2) View of Self	10, 12		2, 5
3) View of Control	2	11b&c, 4	3, 9
4) Job Analysis	3		8
5) Education/ Experience	educ,employ	8	3
6) View of 'Success'	4, 5		2
7) View of Own Department	9	2, 10, 12	11b & c

APPENDIX C

This appendix contains the IT Managers' Questionnaire sent to each IT manager in the sample. Results of the questionnaire are presented in Chapter Four.

CRANFIELD INSTITUTE
OF
TECHNOLOGY

INNOVATION AND TECHNOLOGY

ASSESSMENT UNIT

COMPLETION INSTRUCTIONS

The purpose of this research is to investigate the role and function of I.T. managers across a range of industry sectors.

All answers will be treated in the strictest confidence.

Please attempt to answer all questions.

In the section entitled 'Education & Training' please provide details of any professional or institute qualifications, degrees or HNDs taken.

If the lines provided for written answers are not enough, then extra space has been made available at the end of the questionnaire.

Please return the completed questionnaire in the prepaid envelope provided.

PERSONAL

Name: ______________________ Date of Birth : __________

CURRENT EMPLOYMENT

Nature of business : ______________________

Nº of Employees : ______________ Approx. Nº of Computer Users in your company: ______________

EMPLOYMENT HISTORY (up to 5 only)

Company Name	Years Employed	Job Title	Dept Title

EDUCATION & TRAINING (major items only)

Course Title	Award	Year Passed	Institution

1) In an average week what percentage of staff time is directed towards:

a) Developing new systems ______%

b) Providing a support/maintenance role ______%

2) In terms of organisational control do you see your I.T. department as:
(Please tick only one)

a) Governed by senior management outside your department ( )

b) An autonomous unit ( )

c) Driven by the day to day servicing of end users ( )

3a) Which aspects of your work do you find most professionally satisfying ? Please give examples where appropriate.

____

____

____

____

____

____

b) Which aspects do you find most frustrating ? Please give examples.

____

____

____

____

____

____

4) How important are professional standards (as set by such bodies as CCTA, BCS, BSI, CCITT) as guides for implementing I.T. ? (please circle).

very important 1 2 3 4 5 not very important

5) Please list the main criteria you would use for assessing the success of I.T. implementations.

____

____

____

____

____

____

6) In your organisation the majority of end users have enough understanding of the technical issues to <u>fully</u> exploit I.T. (please circle).

strongly agree 1 2 3 4 5 strongly disagree

7) When you think about the rate of change of I.T. what factors are of most concern to you ?

a) In general,

____

____

____

____

____

____

b) In your own organisation,

____

____

____

____

____

____

8) With respect to question 7 please rate the following factors; very important (1) through to not very important (5).

a) Keeping Hardware & Software spending within the budget ( )

b) Meeting end user requirements ( )

c) Keeping up with the latest technical developments ( )

d) Applying systems for competitive advantage ( )

e) Maintaining adequate staff levels to meet future demands. ( )

9) How does your department integrate I.T. policy with overall business strategy? Please give as much detail as possible.

____

____

____

____

____

10) What criteria does the I.T. department use for determining the level of service and support a user will receive?

____

____

____

____

____

____

11a) Briefly, what is the procedure for setting priorities for the implementation and development of new systems ?

____

____

____

____

____

b) Which individuals have the authority for setting such priorities ? Please provide job titles and department).

c) Which individual ultimately holds the most authority ?

12) The I.T. department should, as a general principal, encourage end users to select their own :

a) software

strongly agree 1 2 3 4 5 strongly disagree

b) hardware

strongly agree 1 2 3 4 5 strongly disagree

13) Under what circumstances do you allow end users to develop their own applications ? Please give examples where appropriate. ('Applications' refers to a range from tailor-made spreadsheets and specialist databases through to Mainframe programming applications in Cobol, for example.)

14) Please tick here to receive a copy of the report ( )

APPENDIX D

Questionnaire Coding.

This section describes the way in which each question was coded for computer analysis following an initial analysis by hand.

Company Background

This information was recorded under four variables :

Sector : The industrial sector of the organisation, divided into four categories.

1 = Banking & financial services
2 = Production/manufacturing sector
3 = Utilities and service industries
4 = Public Sector/Government

Emp_no : The total number of employees in the organisation.

User_no : The number of users that the IT department is responsible for.

Density : The number of users as a percentage of the total number of employees.

Employment History

Two variables were recorded. These were :

History: coded as 1 = always worked in IT. related departments, 2 = predominantly worked in IT. related departments, 3 = more than 50% of career spent outside the domain of IT.

Avg_emp: the average number of years (to the nearest half year) with each organisation

Educational and Professional Background

This was recorded as three separate variables :

Ed_IT: coded as 0 = no formal IT. related education, 1 = formal IT. related education

Ed_type : 0 = none, 1 = Science oriented, 2 = Arts oriented, 3 = Both Science & Arts education

Ed_mngt: coded as 0 = no formal management education, 1 = formal management education.

Question One - Staff Time Allocation

Recorded simply as the percentage time allocated to new systems development and support/maintenance role respectively. In addition, an aggregate variable (Timespend) was recorded. This was coded :

1 = predominantly developing new systems (61%+),
2 = 40 to 60% , staff time roughly split in half,
3 = predominantly support and maintenance role (61%+).

Question Two - Organisational Control

1 = (A), 2 = (B), 3 = (C).

Question Three A - Professional Satisfactions

Initial analysis suggests the following categories :

A body of technical issues relating to systems development, such as "new systems development" or "introducing effective new technologies".

Issues related to cost, for example, "meeting budgets".

Man management issues concerned with IT staff effectiveness.

Service related concerns, including customer satisfaction and user liaison.

Finally, strategic level issues, incorporating strategy development and satisfying business interests.

Question Three B - Professional Frustrations

From the analysis of question 3b it was evident that the answers given fell into four distinct categories. These were :

Q3b_res : where the IT function attempts to control or expresses concerns about IT resources.

Q3b_skill : where the IT function attempts to control or expresses concern about knowledge and skills.

Q3b_user : where the ITF appears hostile to the users, either through what they see as excessive demands on the ITF or by expressing a lack of understanding of IT and an unwillingness to learn.

Q3b_burea : where the ITF. attempts to act independently of the rest of the organisation; a power struggle.

Question Four - Professional Standards

Simply recorded by the number the respondent ticked, 1 for very important through to 5 for not very important.

Question Five - Criteria for Implementation Success

As with question three, the initial analysis showed that the answers given had a tendency to fall into five categories. Please note that a respondent may give a single answer or several.

Q5_cost : the financial cost of the IT innovation

Q5_time : the time required for implementation. This includes the meeting of delivery dates etc.

Q5_m&r : maintenance and reliability of the completed system.

Q5_u_s&n : user related satisfaction and needs. This encompasses end-user acceptance and satisfaction with the finished system.

Q5_b_s&n : business related satisfaction and needs. This includes meeting business needs and strategies.

If the user sites cost as the only success factor, for example, then Q5_cost would have a value of 1 and the other variables would have a 0 value.

Question Six - User Understanding of Technology

Recorded by the number the respondent ticked, 1 for very important through to 5 for not very important.

Question Seven - Rate of Change of IT

This qualitative question was analysed by clustering the responses into 'like' groups of ideas and contents. The headings for the groups are:

1. Software and hardware technology traps, pace of development.

2. problems with software

3. rate of change/development, cost of change

4. long term planning

5. business opportunities

6. knowledge gap

Question Eight A to E - Factors Affected by Change

For each of the five statements (five variables) the response value was recorded.

Question Nine - IT and Business Strategy Integration

Q9_SL: This variable represents an analysis of the responses to identify cases where reference is made to any form of strategic planning of IT

1 No strategic planning (liaison or user led only)
2 Strategic planning

Q9_RRRL: This variable represents a subtler look at the answers given to question 9. It attempts to understand the different forms both strategic and non-strategic planning can take.

1. No integration of business and IT strategy.
2. liaison only : Attempt to co-ordinate IT and business strategy by committee. This commonly takes the form of a quarterly liaison between the ITF and business managers. (Liaison)
3. User led : ITF reacts to short term user driven problems. No strategic linkage of IT with business objectives. (Reactive)
4. IT strategy is related to business strategy. (Related)
5. IT strategy is a result of business strategy. This is where business strategy is dominant, the aims of the business are decided and IT strategy is developed to best enable the business strategy. (Result of)

Question Eleven (A) - Development Procedure

Results from the initial analysis seem to suggest that the answer to this question highlight five areas of procedure. These are :

1. Money/Sponsor: where a system is funded by or championed by a user department. Priorities are based on the sponsor's ability to pay or on priorities set by the sponsor.

2. Business related cost benefit/profitability: where the financial benefit to the company is appraised. This is an attempt to establish a formalised procedure based on economic guidelines.

3. IT department. This is where decisions on priority are taken by members of the IT department, using their own criteria.

4. Users/Management. Priorities are established by departmental managers.

5. IT and users jointly. Priorities are arrived at by joint discussion, an appraisal/amalgamation of the separate criteria of IT and users/managers..

Question Eleven (B & C) - Development Control

Part B relates to the key actors who were stated as having an influence in the system development procedure. Part C attempts to identify who has overall control of development.

In part B the respondents' answers fell into three categories :

1 = Senior management authority dominates.
2 = Solely the province of the IT function.
3 = Some form of joint authority between both business and IT function representatives.

Note that in no cases was any form of control or consultation passed below middle managers.

Answers to part C were a clear cut division between :

1 = A senior business head,
2 = A senior IT figure.

Question Twelve - User Freedom with respect to Software and Hardware

Simply recorded by the number the respondent ticked, 1 for strongly agree through to 5 for strongly disagree. Two variables were used to represent part A (software) and part B (hardware) respectively.

Answers to question 13 were used to reinforce and clarify question 12.

APPENDIX E

Responses to Question 8 - "With respect to question 7 please rate the following factors:"

Q8A - "Keeping hardware and software spending within budget"

Value Label	Value	Frequency	Percent	Valid Percent
very important	1	17	33.3	34.0
	2	15	29.4	30.0
through to	3	11	21.6	22.0
	4	2	3.9	4.0
not very important	5	5	9.8	10.0
	99	1	2.0	Missing
	Total	51	100.0	100.0

Mean 2.260 Median 2.0 Mode 1.0

Valid cases 50 Missing cases 1

Q8B - "Meeting end user requirements"

Value Label	Value	Frequency	Percent	Valid Percent
very important	1	32	62.7	62.7
	2	13	25.5	25.5
through to	3	0	0.0	0.0
	4	2	3.9	3.9
not very important	5	4	7.8	7.8
	Total	51	100.0	100.0

Mean 1.686 Median 1.0 Mode 1.0

Valid cases 51 Missing cases 0

Q8C - "Keeping up with the latest technical developments"

Value Label	Value	Frequency	Percent	Valid Percent
very important	1	2	3.9	3.9
	2	7	13.7	13.7
through to	3	20	39.2	39.2
	4	14	27.5	27.5
not very important	5	8	15.7	15.7
	Total	51	100.0	100.0

Mean 3.373 Median 3.0 Mode 3.0
Valid cases 51 Missing cases 0

Q8D - "Applying systems for competitive advantage"

Value Label	Value	Frequency	Percent	Valid Percent
very important	1	14	27.5	28.0
	2	15	29.4	30.0
through to	3	15	29.4	30.0
	4	5	9.8	10.0
not very important	5	1	2.0	2.0
	99	1	2.0	Missing
	Total	51	100.0	100.0

Mean 2.280 Median 2.0 Mode 2.0
* Multiple modes exist. The smallest value is shown.

Valid cases 50 Missing cases 1

Q8E - "Maintaining adequate Staff levels to meet future demands"

Label	Value	Frequency	Percent	Valid Percent
very important	1	2	3.9	4.0
	2	15	29.4	30.0
through to	3	19	37.3	38.0
	4	8	15.7	16.0
not very important	5	6	11.8	12.0
	99	1	2.0	Missing
	Total	51	100.0	100.0

Mean 3.020 Median 3.0 Mode 3.0
Valid cases 50 Missing cases 1

APPENDIX F

This appendix contains the Service Delivery Questionnaire comprising part of the study of the receipt of IT services. It includes both qualitative questions and an adaptation of the SERVQUAL instrument. Results of the questionnaire are presented in Chapter Seven and Appendix G.

Cranfield Institute of Technology.

User Perceptions and Assessment of Information Technology Service Delivery.

The purpose for conducting this survey is to understand better what issues computer users perceive to be important in the delivery and quality of the information technology (IT) support services which they use.

The information you provide will be treated in the strictest confidence and will only be used for academic research. Individuals or companies will not be identified in any analysis.

C. Matthew Hinton
Innovation & Technology Assessment Unit
Ecotechnology Centre
Cranfield Institute of Technology

Identifier 1:	Identifier 2:

Part One.

When answering the following questions please consider the ***service*** you receive, rather than just the technology. Please express your opinions on the ***ways and processes*** by which computer support services are delivered, rather than just focusing on technology.

Q1) On average, what percentage of your working day is spent working with computers, as opposed to working on other tasks ?

%

Q2) Of that time, what percentage is spent using "Personal Task Systems" - see box below.

%

i.e. Applications whose use is at your *discretion* and where the use you make of information technology (IT) is significantly under your *control*; as opposed to those tasks where you have no control over the way IT is used.

Q3) Which of the following best describes your level of IT understanding ? Please **circle** the appropriate number on the scale.

Novice user 1 2 3 4 5 6 7 Expert user.

Q4) How confident are you with your understanding of IT in relationship to the computing tasks you have to undertake? Please **circle** the appropriate number.

Not very confident 1 2 3 4 5 6 7 Very confident.

Q5) a) Which of the following types of package do you use on your PC ? (please **tick** as appropriate)

b) For what specific purposes are these packages used ?

c) What services do you require from the IT support function for each particular application ?

	A.	B.	C.
example :: Spreadsheets		Project costings, engineering calculations etc	technical backup, training, help applying package to my problem area.
Accounts			
Communications (e.g. e-mail etc)			
Databases			
Graphics & Desk Top Publishing			
Programming Languages			
Spreadsheets			
Word Processing			
Other:			
Other:			

Q6) With specific reference to your organisation, please list the aspects of the IT support service that you believe to be more than adequate and/or less than adequate, and state why.

Aspects of Adequate Service....	Adequate Services are Received Because.........

Aspects of Inadequate Service.....	Inadequate Services are Received Because.........

Q7) In general, do you believe the IT support services you receive are responsive to your needs? Please **circle** the appropriate number on the scale.

highly responsive 1 2 3 4 5 6 7 insufficiently responsive

Part Two.

With respect to the IT services you receive please **rank** the following list of statements in order of priority. Where 1 = most important and 4 = least important.

Question 8.

Statement	Rank.
Providing the latest up to date software should be the priority of IT support staff.	
It is essential that IT support staff understand your problem and can "solve" it first time.	
The IT support function should give you individual attention when required.	
IT staff should keep you informed of developments in language you can understand.	

Question 9.

Statement	Rank.
The IT support function should be flexible enough to learn your specific requirements.	
It is essential that IT support staff relate to your use of information technology.	
IT support staff should strive to have state-of-the-art technology.	
You should be able to contact IT support staff whenever you wish.	

Part 3.

For each of the following statements please state how strongly you agree or disagree by **circling** the appropriate number on the scale provided.

Q10) I believe that IT support staff should direct their efforts into looking for the latest technologies.

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Q11) The IT support function should adjust the language they use to users with different levels of sophistication.

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Q12) It is realistic to expect IT support staff to know what my needs are.

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Q13) It is fundamental for IT support staff to understand my problems and find solutions to them first time.

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Q14) It is realistic for me to expect prompt service from IT support staff.

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Q15) It is acceptable if the IT support function is busy to delay their response to my requests (as long as a reason for the delay is given).

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Q16) The IT support function should provide sufficient maintenance of hardware to prevent faults from occurring.

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Q17) It is unrealistic to expect the IT support function to have the users' best interests always at heart.

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Q18) The support function should provide IT support at times most convenient for all their users.

Strongly agree 1 2 3 4 5 6 7 strongly disagree

Thank you for your co-operation.

C. Matthew Hinton
Innovation & Technology Assessment Unit
Ecotechnology Centre
Cranfield Institute of Technology

APPENDIX G

Financial Services Organisation - Service Delivery and Quality Questionnaire Analysis and Results

Introduction

This appendix represents the analysis of the questionnaire responses for the financial services organisation. It draws on the service delivery model and techniques presented in chapter 3. A with the analysis in Chapter 8, it relies on responses to the service delivery and perception questionnaire (see appendix F).

Analysis

In order to analyse the responses to questions 8 and 9 it is first necessary to attach a score to each response. This is done by awarding a score of "1" if a statement is ranked first, through to "4" if a statement is ranked last. These scores are then totalled to illustrate a representative ranking for all the users who responded. The figures are presented overleaf.

What is immediately apparent is that, when asked to rank the statements, users place most emphasis on groups B, reliability and competence, and C, responsiveness and access. The tangible aspects of the service (group A) are ranked last for <u>both</u> questions.

This matches the responses made at the petrochemicals organisation (see chapter 8). Only subtle differences exist in the levels of response. The financial services respondents have a slightly greater tendency to rank group D higher, and group C lower than their counterparts at the petrochemicals organisation. However, the overall order is left unchanged.

	Questions		Totals			Averages		Ranking		
	Q8	Q9	Q8	Q9	total	ave	+/-	Q8	Q9	total
A	8.1	9.3	103	108	**211**	152.5	+58.5	4th	4th	**4th**
B	8.2	9.2	51	60	**111**	152.5	-41.5	1st	2nd	**2nd**
C	8.3	9.4	73	51	**124**	152.5	-28.5	2nd	1st	**1st**
D	8.4	9.1	83	81	**164**	152.5	+11.5	3rd	3rd	**3rd**

Table X1 - Aggregate Scores for the Ranking Questions (for Financial Services data)

Questions 10 to 18 - The Likert Scales.

Questions 10 to 18 were coded by recording the number circled on the likert scale by each individual respondent. These are then totalled, for each question, to produce a grand total figure for all respondents. The questions are related back to the categories A to D, described previously. A lower score is favourable as it represents a stronger agreement with the statements.

	Questions	Total Scores	Grand Total	Average	Ranking
A	10 & 16	134 & 75	209	105	**4th**
B	12 & 13	114 & 89	203	102	**3rd**
C	14, 15 & 18	58, 139 & 71	268	89	**2nd**
D	11 & 17	66 & 91*	157	79	**1st**

Table F2 - Aggregate Scores for the Likert Scale Questions

As with the ranking questions, users most strongly disagree with group A, the tangibles. However, unlike with questions 8 and 9, users most strongly agree with the statements which correspond to group D, empathy, communication and understanding. By comparison to the petrochemicals data in chapter 8, the statements for group C, responsiveness and access, have been relegated to second in the overall ranking. The reversal in order between groups C and D appears to be the specific result of question 15. Table F3, below, shows the score for group C with question 15 removed. Based on this figure group C would be ranked first, in line with the responses given in chapter 8. Also

* this value represents the inverted score for question 17. This is done so that the negatively phrased question can be compared with the positive ones.

of note, the financial services respondents place almost the same amount of importance on the tangible aspects (group A) of the service they receive, as they do the reliability and competence (group B).

	Questions	Total Scores	Grand Total	Average	Ranking
C	14 & 18	58 & 71	129	65	**1st**

Table F3 - Aggregate Scores for Group C without Question 15

	Questions	Total Scores for Petro Chemicals	Petro-Chem recalibrated[$] ($\alpha$)	Financial Services Scores (β)	Difference between α and β
A	*10 & 16*	168 & 84	144 & 72	134 & 75	-10 & +3
B	*12 & 13*	120 & 112	103 & 96	114 & 89	+11 & -7
C	*14, 15 & 18*	67, 89 & 74	58, 77 & 64	58, 139 & 71	0, **+63** & +7
D	*11 & 17*	75 & 91	65 & 78	66 & 91	+1 & +13

Table F4 - Comparison of Responses to
Likert Scale Questions for the Two Organisations Studied.

[$] the total scores are recalibrated by multiplying them by 0.86. This is because the number of respondents in each organisation varies, 36 in the petro-chemicals and 31 in the financial services. The effect of multiplying by 0.86 is that the petro-chemicals scores are scaled down as if the sample was of only 31. This allows comparison with the financial services scores.

Table F4 compares the responses made to questions 10 to 18 by the two groups of respondents. The scores are recalibrated to enable direct comparison and the differences in score are highlighted in the final column. Most differences fall within acceptable bounds, however the difference in response score to question 15 must be noted. The difference of 63 between the two organisations represents a near doubling of the score for the financial services organisation.

2. Patterns of Usage

a. levels of usage

Questions 1 and 2 provide an initial impression of the levels of computer usage amongst the respondents. Table F5 shows the percentage of the working day spent working with computers for each user.

Label	Number of Users	% of Total Users
Up to 34%	2	6%
35% to 65%	12	39%
66% and Above	17	55%
Total	31	100%

Table F5 -

Question One: Percentage of working day spent working with computers, as opposed to working on other tasks.

Label	Number of Users	% of Total Users
Up to 34%	14	45%
35% to 65%	3	10%
66% and Above	14	45%
Total	31	100%

Table F6

Question Two: Level of Discretionary Usage

b. levels of understanding

Category	Likert Scale Responses	Number of Users	% of Total Number of Users
Towards Novice	1, 2 and 3	7	23%
Average Skills	4	2	6%
Towards Expert	5, 6 and 7	22	71%
Total		31	100%

Table F7 -
Question Three: Which of the following best describes your level of IT understanding?

Category	Likert Scale Responses	Number of Users	Valid % of Total Number of Users
Low Confidence	1, 2 and 3	7	23%
Average	4	1	3%
High Confidence	5, 6 and 7	23	74%
missing value	-	1	-
Total		36	100%

Table X7 -
Question Four - How confident are you with your understanding of IT in relationship to the computing tasks you have to undertake?

4. considerations of what is going well - considerations of what is going badly

This section addresses the questions designed to obtain the users' conceptualisation of what they view as 'good service' and 'bad service' and subsequent levels of satisfaction with the service they receive. Accordingly, there is a strong reliance on question 6, the qualitative descriptions in the respondent's own words, and question 7, the Likert scale.

As with the Petro-chemicals data it is beneficial to address question 7 first, as this provides an initial indication as to whether this group of users feel satisfied with the service they receive. From table F9, it is clear that users are fairly evenly split over whether the support services provided are responsive to needs. 39% of respondents gave answers above the midpoint value of the Likert scale, whilst 42% gave answers below. Of greater concern is the numbers of users who opted for the most extreme responses (6 and 7 on the scale). In all, 32% of users (one in three) stated that the service they received was highly insufficient.

	highly responsive					insufficiently responsive
Response	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Frequency	2	3	7	6	3	5	5
Percent	6%	10%	23%	19%	10%	16%	16%

Table F9 -

Question Seven -In general, do you believe the IT support services you receive are responsive to your needs?

APPENDIX H

Framework for Follow-Up Interview Questions

This appendix contains the interview questions used for the follow up interviews of users who responded to the service delivery questionnaire. These questions were used to guide the interview through the users' perceptions of the process of IT adoption (questions 1 to 3) and assimilation (questions 4 to 6). Finally, the users' perceptions of the overall culture were elicited through questions 7 and 8. The introduction to each interview is provided to highlight how the users' attention was focused within the research boundary.

Results of the interviews are presented in chapter 8.

Framework for Follow-Up Interview Questions

Introduction

I am trying to identify what Factors and Processes lead up to the successful adoption and assimilation of IT within EEEL.

I am interested in the whole process from the initial identification of the idea for the introduction right up to the successful implementation.

I am interested in your perception of how it is here - what are the strong points and what are the weak ones.

Adoption of IT

1. What helps or hinders the adoption of information technology within EEEL ?

2. Thinking about the adoption of IT, where do new ideas usually originate?

3. Are users (and CSG staff) satisfied or dissatisfied with the process of adoption of IT?

Assimilation of IT

4. Do you believe you are using computers to the best of your ability?

5. What are the major factors that constrain your use of computers ?

6. Do you believe there is sufficient availability of training ?

Organisational Culture

7. What do you think typifies the culture of the organisation (EEEL) ?

8. What aspects of EEEL culture encourage or discourage effective use of computing?

APPENDIX I

This appendix contains the data references for chapter five. The references represent papers which either substantiate the point being made or provide suitable examples.

P1 Gardner, E., 1990, Implementation, proc. of the EDI conf. '90.; Clark, C., 1990, The ICI experience, proc. of the EDI conf. '90

P2 Ivannou, L. 1990, EDI sharpening the competitive edge, Euromoney, March edition; Davis, L., 1989, Retailers go shopping for EDI, Datamation, March 89.

P3 Bird, T., 1990, The healthcare experience, proc. of the EDI conf. '90

P4 examples of IT professional target audience publications include:

Networking Management, Computerworld, Computers & Security, Information Today, Systems 3X/400, Network World, Computing Canada amongst others.

P5 examples of organisational management target audience publications include:

Industry Week, Purchasing, Transportation & Distribution, Bank Management, Indutrial Engineering, Healthcare Financial Management, Retailing ad nauseam.

P6 *see* IS Anayzer, vol.27, no.8, August 1989, *see also* Weimer et al. 1991, Integrated manufacturing: systems integrators put it all together, Industry Week, 240, 22, 3-15

P7 a good example is Ferguson & Hill, Missing the Boat: Companies fail to appreciate electronic business, Business Credit, , 90, 11, 21-24

P8 see Coopers and Lybrand, EDI Executive Briefing, December 1988

P9 for example, Ogilve, H., 1991, Electronic ties that bind: Marks & Spencer's pan-european JIT inventory system, Jrnl of European Business, 3, 1, 48-50

P10 McWilliams, G., 1988, Banks & network providers eye EDI, Datamation, 15/11/88. anonymous, 1989, EDI raising quality in the supply chain, Accountancy, December 89. Nilson, A. ed., 1991, EDI in finance, Elsevier publishers ltd.

P11 Sorkin, H., 1991, Nonrepudiation: bits and signatures, Internal Auditing, 6 3, 24-31

P12 Dunleavy, J., 1988, EDI Executive Briefing, December '88, Coopers & Lybrand

P13 IS Anayzer, 1989, vol.27, no.8, August 1989

P14 Smith, R., 1990, A multinational EDI case study, proc. of the EDI conf. '90.
Garner, E., 1990, Implementation, proc. of the EDI conf. '90.
Evans, K., 1991, Tools of the Trade, Purchasing, 111, 6, 74-79