A Study of the Factors Influencing the Successful Development, Implementation and Operation of Community Information Systems in the NHS

by

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ABSTRACT

The factors that influence the ultimate level of success or failure of systems development projects have received considerable attention in the academic literature. Two particularly significant areas of interest have been the importance of applying best practice during systems development and the need to explicitly consider organisational issues to ensure a positive organisational impact. However, despite the existence of a well developed best practice literature and an emergent organisational issues literature, many projects still fail.

The record of the NHS has been particularly poor in terms of the successful development and implementation of information systems and it was thought that this area would provide a fertile domain for information system research. Whilst the use of information systems in community healthcare has increased greatly over the last ten years the majority of existing research has been conducted in acute hospital environments with little attention devoted to the community sector. Consequently, this research project has two main aims: To identify the key best practice variables and areas of organisational impact associated with the development, implementation and use of a Community Information System (CIS) in National Health Service Trusts; and to examine the relationships between these two sets of variables and the system's resultant level of effectiveness.

This research project has a number of positive methodological attributes in that it studies a homogenous organisational sector using a common type of information system and so minimises the potentially confounding influences of sector and system. In addition, the research design involves a three stage approach, combining both quantitative and qualitative research approaches.

The research project has produced several key findings. A positive relationship was identified between the adoption of best practice and system effectiveness and similarly, there was a positive relationship between the level of organisational impact and system effectiveness. In order to ensure a positive organisational impact it was found that the successful treatment of key organisational issues is required. In addition, two new variables have been identified, user ownership and positive user attitudes, that play an important mediating role in ensuring system effectiveness. Finally, it was also recognised that the adoption of best practice variables had a dual role, directly influencing the level of perceived system effectiveness but also as a method of effectively managing organisational issues, user ownership and user attitudes.

In summary, this study has emphasised the importance of adopting best practice and assessing and managing organisational impact during a community information system development project to ensure system success. These results will be of particular interest to practising IM&T Managers in the NHS and to the wider academic community. A series of practical recommendations are presented at the end of the thesis.

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Chapter 1: Introduction

1.1 BACKGROUND TO RESEARCH PROBLEM

In both the public and private sectors, the acquisition and successful introduction of information technology is by no means a straightforward process. Large numbers of information systems projects are either excessively over budget, months or years behind schedule, of poor quality, or simply fail to adequately satisfy users' requirements. Statistics on the success and failure of information systems are plentiful, and generally depressing (For example: Lyytinen and Hirschheim, 1987; Kearney, 1990; Hochstrasser and Griffiths, 1991; Clegg et al., 1997a). Therefore, the need to study and understand the key factors associated with the successful development, implementation and use of an information system remains a major research agenda within the information systems discipline.

In the past twenty years much interest has been generated in the identification of factors critical to the successful outcome of systems development projects. A number of empirical and in-depth studies have been conducted which examine success factors in the development and implementation of information systems (For example: Cerullo, 1980; Rademacher, 1989; Yap et al., 1992; Sauer, 1993; Willcocks and Margetts, 1994; Whyte and Bytheway, 1996; Flowers, 1997; Li, 1997). There is,

therefore, a well-documented body of 'best practice' knowledge that should guide the IS practitioner in the effective development and implementation of information systems. However, there exists a paradoxical situation in that far too many projects still fail, despite the availability of this body of knowledge, which should help to promote success. Why in so many instances should this be the case? It could perhaps be that the advice is either: blatantly disregarded; not universally appropriate; not well disseminated; or not always possible to heed. Alternatively it might be that the adoption of existing best practice guidelines is not, by itself, sufficient to ensure the successful outcome of systems development projects. Consequently, there remains a pressing need for further research to study the relationship between the ability of a systems development team to adopt best practice and the resultant level of success.

Furthermore, the existing 'best practice' literature has limitations in terms of either depth or generalisability. For example, survey studies, whilst providing the breadth of coverage, lack the capacity to effectively deal with the complexity of the system development process (Sauer, 1993). By contrast, case studies, whilst far better suited to handling the complexities of systems development, frequently relate to only one case. Where multiple cases have been studied then these examples are typically garnered from a wide variety of sectors, on a vast range of types of applications (Doherty et al., 1998) and can be undermined due to the effects of confounding factors such as sector or system. In both instances the generalisability of findings is problematic. Consequently, there is still a need for studies that address the role of best practice in order to develop a greater understanding of 'how' and 'why' systems development projects still fail. Gable (1994) suggests that these new insights might be best achieved through combining qualitative and quantitative research methods, allowing deeper understanding but increasing the generalisibility of findings.

This research project attempts to overcome these weaknesses by combining quantitative and qualitative research methods that can prove useful in building a wider picture of the phenomenon studied (Reichardt and Cook, 1989), can enable the validation of findings (Jick, 1979) and can help in explaining diverging results (Trend, 1989). Furthermore, this study attempts to account for confounding factors by targeting a single organisational sector in which a standard type of application of IT

has been developed and is still currently being implemented.

A further important strand of current IS research concerns the organisational impact of information systems. It has been recognised that the level of penetration and sophistication of information technology is growing rapidly and with this expansion goes a concomitant increase in the level of the organisational impact of information technology. For example, it has been found that the implementation of information systems can precipitate changes in: organisational structure (Markus and Robey, 1983; Stebbins et al., 1995); organisational culture (Bufferfield and Pendegraft, 1996; Pliskin et al., 1993); working practices (Eason, 1988; Hornby et al., 1992) and the distribution of power (Sauer, 1993; Thach and Woodman, 1994). Recent research (Doherty and King, 1998) also suggests that the organisational impact of systems is gradually increasing. For the purposes of this study, the following working definition of organisational impact has been developed. It is proposed that organisational impact can be defined as:

> *'significant changes to the way in which an organisation is structured, managed and ultimately conducts its business.'*

Venkatraman (1991) suggests that there is a direct relationship between the level of organisational impact and the resultant level of organisational benefit; the higher the impact, the greater the potential benefit. However, to date, little empirical work has been conducted to explore this relationship. Consequently, there is a need for further research that explores the precise nature of the relationship between the level of organisational impact engendered by the development, implementation and use of an information system and the resultant level of system success.

One sector which has enjoyed high levels of investment in information technology, yet failed to fully reap its benefits, is the National Health Service (NHS) in the United Kingdom (National Audit Office, 1990). The recognised importance of IT within the NHS stems from the mid 1980s, with the publication of the inaugural national strategy for IT (Department of Health and Social Security, 1986). Since then there has been a headlong drive for improvements in the quantity and quality of information,

resulting in millions of pounds being invested in IT (Keen, 1994). In 1990, however, a National Audit Office report (National Audit Office, 1990) concluded that: *'The management of computer systems [within the NHS] was often weak, with many failures to follow good practice, resulting in poor value for money'*. In order to arrive at these disconcerting conclusions, the same report had assessed eleven NHS computer projects on five key features of best practice, and had found that the major shortcomings included: *'incomplete feasibility studies; loose contractual arrangements; inadequate planning; weak control and an absence of post-implementation reviews'*. More recently, this appraisal of the situation has been supported by Clegg et al., (1997a) who conclude*: 'The health sector is still seen as performing rather poorly in the field of IT'*.

Whilst the use of information systems in community healthcare has increased greatly over the last ten years (Audit Commission, 1997) the majority of existing research has been conducted in acute hospital environments with little attention devoted to the community sector. Very little academic research has addressed the organisational impact of the development, implementation and use of information systems within the provision of healthcare within the community, that is typically highly decentralised and not hospital based.

Furthermore, the performance of information systems in the community sector has been generally poor. A recent Audit Commission report (Audit Commission, 1997) noted that*: 'most [community] information systems provide only limited support to front-line staff'; 'many systems are out-dated and badly designed'* and *'the introduction of technology is usually badly planned'*. In a similar vein, the recent NHS IM&T Strategy (Burns, 1998) also identifies failings in existing community information systems stating that *'the inadequacies of information systems to support community health staff have been apparent for many years'*. There is, therefore, still a pressing need for well-focused research to provide insights into how levels of failure can be reduced from within the NHS in general and with regard to the community sector in particular.

The NHS provides an excellent research environment for information systems

research for a number of reasons. The NHS is a large and complex organisation and is likely to exhibit many of the issues that are found in other organisational sectors. Consequently, recommendations that are developed in this environment are likely to have been thoroughly tested because of the complexity of the organisation. In comparison to other organisational sectors the NHS has lagged behind in its investment and use of IT and consequently, ambitious goals are now being set for the uptake of IT over very short timescales. This rapid uptake and application of IT is adding to the risk and problems that NHS organisations are facing. There is increasing pressure on practitioners to 'get it right first time' and limited opportunities for analysts to learn from their mistakes. Consequently, IS practitioners in the NHS are very keen to gain insights into the factors that influence system success and are more likely to contribute to research projects in this area. Finally, the ability of the researcher to gain access to both IT professionals and other staff is thought to be easier within the NHS than in other organisational sectors, because of the natural inclination of the organisation towards research and learning to improve the delivery of patient care.

There is, therefore, still a pressing need for well-focused research to provide insights into how levels of failure can be reduced from both a general perspective and with regard to the NHS in particular. To help investigate these issues this study intends to explore the factors that affect the success of Community Information Systems (CIS) within the NHS. It was envisaged that the application of CISs within the community sector would provide a particularly fertile research domain for two key reasons. Firstly, Community Trusts form a homogeneous organisational sector and CISs provide different instances of a common type of application and therefore the number of confounding factors in the study are greatly reduced. Secondly, two recent official reports (Audit Commission, 1997; Burns, 1998) have identified a high degree of variability in the quality of CIS with many existing systems failing to deliver the anticipated benefits. Consequently, it would be possible to compare and contrast the experiences of Trusts, which had experienced a range of different outcomes.

It was envisaged that through the exploration of the issues identified above, the research would provide important insights into the successful development and

implementation of information systems within the NHS in general and Community Trusts in particular. In addition, it would also be possible to provide advice to IS practitioners on the importance of adopting key elements of 'best practice' and management practices to ensure that the organisational impact of an information system has a positive effect on the overall level of perceived success associated with the system.

1.2 OBJECTIVES OF THE STUDY

The main theme of this study centres around a few fundamental questions such as, 'What are the key elements of best practice that need to be adopted for the successful development implementation and operation of a CIS?' 'What effect does the organisational impact resulting from the implementation of a CIS have on the overall perceived success associated with the system?' and 'How can the organisational impact be managed effectively in order to ensure that it has a positive, rather than negative, effect on the overall perceived effectiveness of the CIS?' It was envisaged that it would be possible to address these issues by empirically exploring the experiences of Community Trusts that have implemented a CIS. More specifically, the primary objectives of this study are:

1. To explore the relationship between the actuality of a CIS project team to adopt best practice and the resultant level of success or failure of the operational information system.

2. To explore the relationship between the level of organisational impact brought about by the system and the resultant level of success or failure of the operational information system.

Two additional objectives were developed in the light of results from the exploratory research stage and survey research stage of the study. The exploratory research provided evidence to suggest that there was a relationship between the level of organisational impact engendered by a CIS and system effectiveness. This preliminary finding highlighted the need to investigate how a systems development team could ensure that the impact resulting from the introduction of a CIS had a

positive effect on system success. Consequently, the third research objective of the study was developed:

3. To explore how the organisational impacts resulting from the development and implementation of a CIS can be effectively assessed and managed to ensure that they are positive.

In addition, the survey research highlighted the importance of user attitudes and user ownership to CIS success and a review of the literature suggested that these variables could be influenced in both the development, implementation and operational phases of a system's life. In this respect, it appeared that these variables were different to both best practice and organisational impact and should, therefore, be considered separately in the final stage of the research. These findings translated into a fourth objective for this study:

4. To explore the relationship between the ability of a CIS project team to develop positive user attitudes and user ownership and the resultant level of success or failure of the operational information system.

1.3 SIGNIFICANCE OF THE STUDY

As has been indicated in the opening section of this chapter, the incidence of information systems failure still remains high despite the existence of a comprehensive best practice literature. This fact would suggest that further research into the uptake and application of best practice is still required to explain this paradox. A possible reason for the continuing occurrence of failures is that the adoption of best practice is not sufficient alone to ensure system success. This research project explores the possibility that the level of organisational impact engendered by the development, implementation and operation of an information system may have a crucial influence on the overall level of perceived system effectiveness and therefore, success.

This research explores the assertion made by Venkatraman (1991) that the greater the organisational impact that occurs as a result of system implementation, the greater the

benefit that accrues to the host organisation and the likelihood of success. It has also been noted by Doherty and King (1998) that the levels of IT induced organisational impact are rising and there is an increased need to ascertain the role that organisational impact may play in successful systems development projects. This research explicitly studies the relationship between organisational impact and success using both quantitative and qualitative methods. Furthermore, the management practices that can ensure a positive impact are also investigated with the objective of providing useful recommendations for both practitioners and the wider academic community.

Another important area that is addressed by this study is the role of user ownership and positive user attitudes in systems development projects. Whilst some studies have noted the importance of user ownership and positive user attitudes, little work has specifically targeted these factors to identify why they are significant and how they can be achieved. Furthermore, this research has typically been conducted in isolation from the research into best practice. For example, most large studies of best practice factors (for example: Miller and Doyle, 1987; Whyte and Bytheway, 1996; Doherty et al., 1998) do not include user ownership and positive user attitudes. Consequently, it is difficult to judge the relative importance of these factors and their relationship with other best practice factors. This study explicitly explores the roles of both user ownership and positive user attitudes in respect of community information systems and assesses their importance to successful systems development projects.

As a context the NHS has provided a fertile domain for several research projects that have addressed the success and failure of information systems. However, this research has tended to concentrate on the provision of acute healthcare, usually in the stable, centralised, ward based, hospital environment. Very little academic research has addressed the organisational impact of information systems within the community sector, that is typically highly decentralised and not hospital-based. This research attempts to redress this imbalance by studying information systems within community healthcare.

Finally this study also makes a further important contribution because of its

methodological standpoint. As well as combining qualitative and quantitative methods this study adopts a strategy that greatly reduces the number of possible confounding factors. Community Trusts form a homogeneous organisational sector and community information systems provide different instances of a common type of application; consequently the confounding factors of system and sector are removed from this study. Furthermore, two recent official reports (Audit Commission, 1997; Burns, 1998) have identified a high degree of variability in the quality of CIS's with many existing systems failing to deliver the anticipated benefits. It was therefore possible to compare and contrast the experiences of Trusts, which had experienced a range of different outcomes. In many previous studies the effect of confounding factors have either been ignored or proved practically impossible to reduce and consequently this study provides a methodological contribution in itself.

1.4 CONTEXT OF THE STUDY

To address the overall research objectives a three stage research strategy was proposed that combined qualitative and quantitative methods. The first stage of the study was intended to develop and refine the terms of reference for the study and involved 13 semi-structured in-depth interviews at one Community Trust. The second stage of the research assessed the uptake and application of CISs in England and Wales through a postal questionnaire survey. The questionnaire also attempted to gauge the level of adoption of best practice, the level of organisational impact experienced and indicate the level of success associated with existing CISs. Finally, the third stage of the study involved a series of semi-structured interviews conducted at five Community Trusts to explore the relationships between best practice and success; organisational impact and success; user attitudes and user ownership and success; and best practice and organisational impact. As a result of adopting this three stage approach, each stage of the research had specific research objectives set that are discussed in detail in the appropriate chapter.

1.5 ORGANISATION OF THE STUDY

The content of this thesis is organised into eight chapters. Figure 1.1 shows an overview of the research process and corresponding chapters.

Chapter one gives an overview of the thesis, the identification of the research problems, a critique of the literature, the reasons for undertaking the research, the research objectives and the significance of the study.

Chapter two reviews the IS failure literature and examines how IS success can be measured objectively. The importance of best practice factors and organisational impact are also discussed in relation to successful systems development projects as are the main methods for tackling organisational impact. A review of recent developments in the NHS is also provided with specific reference to the role of information and information technology.

Chapter three outlines the research methods used in collecting the data for analysis. Various research strategies were explored before the most appropriate strategies were chosen. The two strategies that are adopted in this project, case study and survey research are given particular emphasis. The research methods that were adopted in each strategy, semi-structured interviews and a self-completion questionnaire are also discussed.

Chapter four focuses on presenting the results of the exploratory research and the variables that were identified to be included in the subsequent stages of the research project. The overall research framework is also further refined in the light of the exploratory research analysis.

Chapter five explains how the research variables were operationalised and incorporated into a questionnaire designed to confirm their applicability to other Community Trusts in England and Wales. The results presented in chapter five show, through the use of statistical correlations, a series of possible relationships between best practice variables, organisational impact variables and system effectiveness. The overall research framework is reviewed again in the light of the survey research analysis.

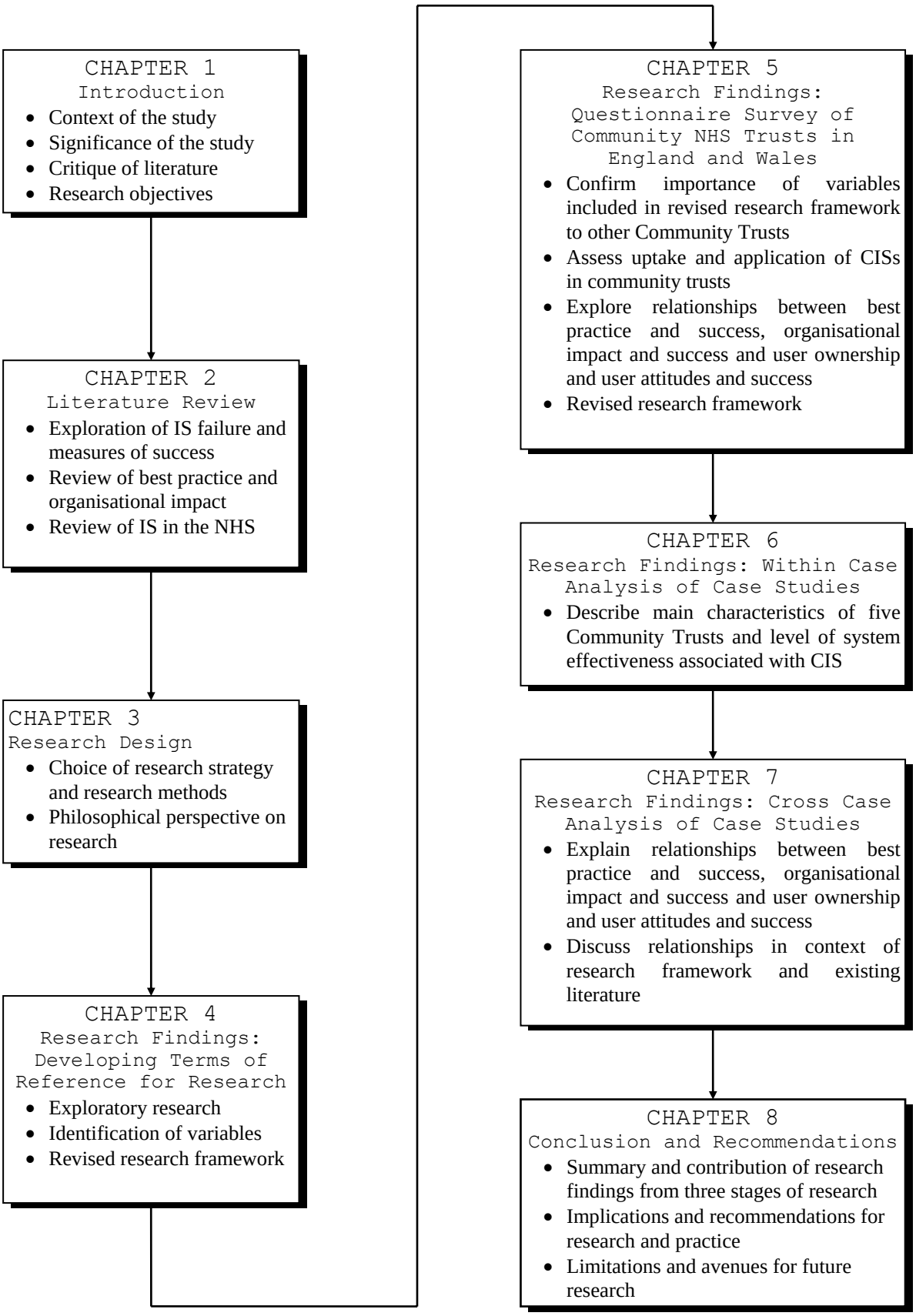
Chapter six explains how five Community Trusts were targeted for further research designed to study the possible relationships identified in chapter five in more depth.

The descriptive findings from the within case analysis for each Trust are presented and briefly discussed.

The within case analysis forms the basis for the more explanatory cross case analysis presented in chapter seven. The cross case analysis allows a comparison of the different experiences recorded at each Trust and attempts to provide explanations for the differing levels of system effectiveness recorded at each Trust.

Finally, chapter eight draws together the conclusions and recommendations from the research project. The key findings and contributions of the study are presented and discussed in the light of the three stages of the research, the overall research objectives and the existing literature. The chapter also discusses: the implications of the study's findings for both research and practice; the limitations of the research; and potential areas for further research.

Figure 1-1 Overview of the Thesis Structure



Chapter 2: Literature Review

2.1 INTRODUCTION

Over the past twenty years the level of penetration and sophistication of information technology has grown dramatically, with computer-based information systems actively supporting all key business processes and significantly enhancing both the operational effectiveness and the strategic direction of organisations of all types. Unfortunately, in both the public and private sectors, the successful acquisition and introduction of information technology is still dogged by high failure rates (Lyytinen and Hirschheim, 1987; Kearney, 1990; Hochstrasser and Griffiths, 1991; Clegg et al., 1997a). It is suggested that there are two possible reasons for this continuing poor performance. Either, systems developers, for whatever reason, are failing to adopt the key elements of best practice needed to ensure systems success. Alternatively, systems developers may be failing to evaluate and manage the organisational impact that is engendered by the introduction of an information system. One example of an organisational sector that has enjoyed high levels of investment, but is still characterised by poorly performing information technology, is the National Health Service (NHS) in the United Kingdom (National Audit Office, 1990). Consequently, this chapter intends to review the existing literature concerned with: IS success and failure and how it can be measured; the adoption of best practice during systems

development projects; the organisational impact that is engendered by the implementation of an information system and how it can be tackled through the treatment of organisational issues; and the experiences of the NHS with regard to information technology.

2.2 INFORMATION SYSTEM SUCCESS AND FAILURE

Over the last ten years organisations of all shapes and sizes have become progressively more dependent on information technology if they wish to survive and hopefully, thrive in an increasingly competitive environment. Consequently, the level of penetration and sophistication of information technology is growing rapidly (Martinez, 1994). IT now represents about half of all capital investment on a global basis and much of the workforce in the developed world relies on telecommunications and computer-based information systems (Martinsons and Chong, 1999). In the early 1990's the world's largest economies were spending on average 4% of their gross national product (GNP) on IT with this figure expected to double before the end of the century (Coombs, 1993). In 1993, company expenditure on IT stood at 1.5% of annual turnover, itself an increase on 1992's figure (Willcocks and Lester, 1993). In the UK this represents an annual spend of over £12 billion. Similarly, by 1993 UK public sector IT spending constituted over 1.7% of total government expenditure, which represents an annual spend in excess of £2 billion (KEW Associates, 1992).

As a result of this increase in investment greater attention has been paid to the levels of success associated with IT. Researchers have concluded that while IT now underpins most forms of commercial, industrial and government activity a considerable number of these innovations are ineffective and under utilised (Clegg et al., 1997a). What has also become clear is that not only are these investments in IT not performing well, but that the incidence of failure is alarmingly high and of concern to both organisational management and information systems professionals (Davis et al., 1992). It is noted that despite the increasing sophistication of IT, information systems are continuing to fail either at the development, implementation or use stage (Poulymenakou and Holmes, 1996). Galloway and Whyte (1989) suggest that one in two IS development projects will not lead to successful systems and in the UK financial sector, one in four managers believe that most of their projects have

failed (Aldrich, 1994). More recently, Clegg et al. (1997a) have found that up to 90% of IT projects fail to meet their goals, 80% are late and over budget and 40% are abandoned.

Consequently, over the past 20 years considerable interest has been devoted to identifying the factors critical to the successful outcome of systems development projects. A principal outcome of this interest has been the publication of a wide range of research studying IS failure. In the past, information systems were primarily developed to support the administrative functions within a business, by simply automating existing processes, without fundamentally changing the way an organisation operated. The early studies proposed that technical aspects of systems development were the primary cause of IS failure because technology was not sufficiently advanced to cope with the demands of IS (Lyytinen and Hirschheim, 1987). It was assumed that as technology became more sophisticated so development problems and the number of failures would be reduced. However, it has been shown that successfully addressing the technical specifications of an information system is not enough to ensure that the system will be considered a success (Schmitt and Kozar, 1978).

In recent years organisations have witnessed significant increases in the scale, complexity, connectivity and strategic focus of information systems. The current trend is for information systems, which are highly integrated, have the ability to disseminate information throughout an organisation, and often have become an integral part of the actual product or service provided (Doherty and King, 1998). Such trends mean that new information systems may bring about changes to an organisation's structure, working practices and culture, all of which may in turn alter the way in which power and resources are distributed throughout a organisation (Stowell and West, 1994). It would appear that as the level of penetration and sophistication of technology rises, so there is a concomitant increase in the level of human and organisational impact resulting from the introduction of an information system. Consequently, the need to explicitly address human and organisational issues in the systems development process has also risen.

Concern with the relationship between information systems failure and organisational and behavioural issues is not a new phenomenon. The importance of organisational issues in systems development projects was first recognised in the mid 1970's by Lucas (1975: p116) in his much cited work *'Why Information Systems Fail'*. In this book, Lucas argued that concentrating on the technical aspects of systems and a tendency to overlook organisational behaviour problems and users are the reasons most information systems have failed. Subsequent empirical research has supported Lucas's conclusion and various researchers have identified the crucial role that organisational and behavioural issues play in determining the level of system success. For example, Hornby et al. (1992) state that, *'Lack of attention to organisational and human issues it is proposed, is a major contributory factor in the under performance of IT systems'* and Ewusi-Mensah and Przasnyski (1994) have found organisational issues to be the most widespread and dominant factors contributing to the abandonment of information system development projects. Similarly, Ahn and Skudlark (1997: p3) take the view that organisational issues have now overtaken technical issues in their importance to system success stating, *'Despite the different definitions of information systems failures it is generally agreed that most of the reasons for failure are related to organisational and behaviour issues rather than technical ones'*.

However, despite the considerable amount of research concerned with investigating the factors that influence the success or failure of an information system and the recognition of the need to specifically address human and organisational issues in development projects to ensure a positive organisational impact, the incidence of systems failure remains high. This continuing poor performance may be due to either the inability of project teams to adopt the key elements of best practice discussed in the literature or because the organisational impact resulting from a system's implementation is still not being adequately assessed and managed during the development project. The importance of adopting best practice and managing key areas of organisational impact are reviewed in later sections of this chapter, however, before these issues can be investigated it is first necessary to review how IS success and failure can be measured.

2.3 MEASURING SUCCESS IN INFORMATION SYSTEMS RESEARCH

As a result of the role of information technology in organisations continuing to expand in scope and complexity so there has been increased interest from IS researchers and professionals in assessing the success of computer based information systems. Consequently, the need to derive theories and criteria for judging information systems success becomes crucial (Garrity and Sanders, 1998). However, despite a large number of studies attempting to assess the factors that contribute to information systems success, the concept remains difficult to define (DeLone and McLean, 1992). Different researchers have attempted to study different aspects of success and in so doing have made comparisons difficult. However, more recently there have been attempts to provide more complete measures of IS success to address these problems. This section reviews some of the most popular methods of measuring IS success and provides a summary of DeLone and McLean's (1992) taxonomy of success measures that is used as the basis for measuring community information system success in this study.

2.3.1 Individual Measures of Success

Garrity and Sanders (1998: p2) suggest that information systems success should be measured at multiple levels of analysis. At the organisational level IS success can be measured through organisational performance assessing the contribution the system has made to improved revenue, market share or return on investment. Process or function level measures of success are concerned with reductions in cost and efficient use of resources. The third level of success measurement is at the individual level. At this level success measures focus on the users' perception of the utility of the system and their satisfaction with the information system. It has been documented that measures at the individual level have been the most popular methods adopted by researchers to study MIS success (Bailey and Pearson, 1983; Ives et al., 1983; Ives and Olson, 1984; Davis et al., 1989; Allingham and O'Connor, 1992).

In studying end users' reactions to information systems, researchers have concentrated on the concept of user acceptance. It is suggested that user acceptance is a critical factor in determining the success or failure of information technology (Davis et al., 1989; Torkzadeh and Dwyer, 1994). To measure user acceptance two possible

surrogate measures have been proposed: user information satisfaction (UIS) and system utilisation. The main difference between the two methods is that UIS measures the subjective value of the product while system utilisation attempts to measure an objective value which is a function of its specification in relation to competing products (Eilon, 1993).

Bailey and Pearson (1983) defined UIS as a '*multidimensional attitude of the user toward different aspects of an information system.*' Similarly, Ives et al. (1983) refer to UIS as the perceived effectiveness of an information system and define it as '*the extent to which users believe the information system available to them meets their information requirements.*' Consequently, UIS can be conceptualised as the end users' attitude toward the computer application they use in the traditional data processing environment. However, Ives et al. (1983) also propose that because UIS is a perceptual or subjective measure of IS success its value is at its highest when objective determinants of IS effectiveness are not available. They argue that system usage (utilisation) can be a surrogate indicator of success under certain conditions. For example, if users consider the system to be unreliable or its data inaccurate then their usage will reflect those doubts and similarly if usage is voluntary, the system will be avoided. Srinivasan (1985) supports this view and states that '*if the user exhibited increased evidence of system use in situations where use was not mandatory, then he must find the system useful.*'

2.3.2 DeLone and McLean's' Taxonomy of IS Success

DeLone and McLean (1992) acknowledge the importance that has been placed on both user information satisfaction and end user system utilisation and accept that they may be used as surrogate measures of IS success. However, they propose that future research into IS success should not concentrate solely on these measures but employ a wider taxonomy to measure success. Consequently, DeLone and McLean (1992) suggest a further four categories to be employed with both UIS and system utilisation thereby generating an integrated measure of success.

The first of the additional categories is system quality and is concerned with measures of the information processing system itself. These measures are based on more

engineering orientated performance characteristics of the systems in question. For example, Hamilton and Chervany (1981) proposed a formative evaluation scheme to measure system quality that assessed the system with regard to data currency, response time, turn around time, data accuracy, reliability, completeness, system flexibility and ease of use.

The second category concerns the quality of the information that is produced from an information system. This information quality is usually assessed on the basis of the reports that are produced from the system. Several researchers have developed multi-item measures to assess information quality such as Bailey and Pearson (1983) who included seven 'information quality' items in their top ten most important items for measuring user information satisfaction. These items were, in descending order of importance: information accuracy; output timeliness; reliability; completeness; relevance; precision; and currency.

The third additional category is the effect of information on the behaviour of the recipient and is termed individual impact. DeLone and McLean (1992) note that measuring IS through 'impact' is possibly the hardest measure to clearly define. They argue that impact is closely related to performance and so can be assessed in the context of improvements in an organisation's performance providing evidence of a positive impact. However, impact could also be taken to refer to providing the user with a better understanding of the decision context, improving their decision making productivity and has resulting in a change in user activity or changing a users perception of the usefulness and importance of an information system. Mason (1978) has suggested that a method of measuring information system impact on the individual is to determine whether the new information causes the user to change their behaviour. Ein-Dor et al. (1981) operationalised this method by asking decision makers whether using an information system had ever led to a change in a decision or a new decision.

The final additional category proposed is that of organisational impact[1]. This category

[1]It should be noted that the use of the term organisational impact by DeLone and McLean (1992)

is concerned with assessing the effect of information on the host organisation's performance. DeLone and McLean (1992) argue that measures of organisational performance are of particular importance to information system practitioners because of the need to demonstrate a return on IT investment. Measures of organisational performance frequently involve studying operating cost reductions external to the information processing environment (Emery, 1971) or the MIS contribution to company profits (Hamilton and Chervany, 1981). In non-profit organisations, such as government agencies, Danziger (1987) suggests that productivity gains can be used to measure a system's impact on an organisation. He proposes five productivity measures of staff reduction, cost reduction, increased work volume, new information and increased effectiveness in serving the public. If the functional output of the government department or sector is increased with the same or reduced resource inputs then it can be assumed that productivity gains have occurred.

In creating the six success categories based on their comprehensive literature review, DeLone and McLean (1992) identify that MIS success is a multidimensional construct and that it should be measured on this basis. They also emphasise that in selecting success measures consideration is given to other issues associated with the research context. These variables may include: the independent variables being researched; the structure, size and environment of the organisation being studied; the technology being employed and the task and the individual characteristics of the system under investigation (Weill and Olson, 1989).

However, although being widely accepted as an excellent attempt at developing a comprehensive measure of IS success, DeLone and McLean's work has been criticised in a number of respects. Some researchers have suggested that the model is incomplete in certain areas and have suggested the inclusion of additional factors such as user involvement (Seddon and Kiew, 1994). In addition, it has also been argued that the model presents too narrow a view of the scope and impact of an information

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differs from the definition of organisational impact adopted for this study. DeLone and McLean (1992) only refer to organisational impact in terms of the effect of the information system on the performance of the host organisation, whereas this study considers organisational impact to refer to changes in structure, management and ultimately the way an organisation conducts its business.

system, and neglects other factors which interact with any business change (Ballantine et al., 1998: p58). Consequently, several researchers have attempted to revise and extend the DeLone and McLean model. For example, Bonner (1995) tentatively introduces the concept of information awareness in his revision of the model and Garrity and Sanders (1998) extend the model by identifying four dimensions of user satisfaction.

One of the most comprehensive attempts at developing the DeLone and McLean model has been the 3-D model of IS success presented by Ballantine et al. (1998). They argue that the new model improves the understanding of the concept of IS success by separating success into three fundamental dimensions or levels; the technical *development* level; the *deployment* to the user; and the *delivery* of business benefits. It is argued that the principal value of the 3-D model is that it helps conceptualise a broader view of IS success, by supporting complex contingencies. However, the fact that the model is particularly complex makes it difficult to operationalise and therefore reduces its practical value for empirical research projects.

Although various extensions have been proposed for DeLone and McLean's (1992) taxonomy of success, it is suggested that the original model still has several positive attributes that warrant its continued use in IS research. It consolidates existing research drawing on 180 research papers, it classifies the measures of information systems success into plausible groupings, it identifies different stakeholder groups in the process and it has been considered a suitable foundation for further empirical and theoretical research. The model is well respected within the IS research community and its general acceptance has been manifested in its frequent use in IS research projects (for example: Bonner, 1995; Li, 1997; Doherty, et al., 1998). Consequently, the measure of success that has been developed for this study is based on the model developed by DeLone and McLean. The limitations of the model, in terms of its incomplete view of success, are addressed through the inclusion of four additional items specific to the research context to complement DeLone and McLean's six categories. A further discussion of these additional items is provided in chapters five and six.

2.4 BEST PRACTICE IN SYSTEMS DEVELOPMENT

Section 2.2 has shown that over the past twenty years much interest has been generated in the identification of factors critical to the successful outcome of systems development projects. A range of empirical and in-depth studies have been conducted that examine success factors in the development and implementation of information systems. Doherty et al. (1998) have argued that the existing literature can be classified as follows:

1. Empirical studies that invite managers to identify and/or rank a selection of success factors to determine which are the most important in influencing the successful outcome of information systems projects (for example: Rademacher, 1989; Whyte and Bytheway, 1996);

2. Empirical studies that seek to identify a statistical relationship between systems development practices and the ultimate failure (Ewusi-Mensah and Przasnyski, 1991) or success (Yap et al., 1992) of systems development projects;

3. Focused empirical studies that seek to identify success factors for specific types of systems, such as executive information systems (Cottrell and Rapley, 1991) or types of organisation, such as small businesses (Yap et al., 1992);

4. Empirical studies that seek to explore the relationship between a single factor, such as user involvement (Tait and Vessey, 1988;), organisational issues (Doherty and King, 1998), or management styles (Lu and Wang, 1997) and the ultimate success of a systems development project;

5. Case studies that examine a number of failed systems development projects and seek to identify common contributory factors (for example: Lockett, 1987; Sauer, 1993; Willcocks and Margetts, 1994; Flowers, 1997);

6. Case studies that thoroughly analyse the contributory factors implicated in the failure of single systems (for example: Oz, 1994; Beynon-Davies, 1995; Coe,

1996; Reimus, 1997).

A classification, such as the one outlined above, clearly demonstrates the range and volume of literature currently associated with systems development projects and the development of common themes in best practice. These, and other studies, have helped to focus IT professionals' attention on the importance of a huge range of different factors far too large to be practically addressed in a single research project. Consequently, rather than reviewing all of the best practice variables that have been identified in the literature the following sections will concentrate only on those four factors that were ultimately utilised in all three stages of the research project. In short[2], the rationale for focusing upon these factors (namely: senior management commitment and participation; user involvement; user training/user support; and systems testing) was based upon:

- The results of the exploratory research, which indicated their particular importance in the context of the development and implementation of community information systems;

- Their prominence in the information systems literature, especially with respect to the development of systems in the NHS (National Audit Office, 1996; Doherty et al., 1998) and the public sector (Flowers, 1997).

Each of these key best practice variables is briefly reviewed below.

2.4.1 Senior Management Commitment and Participation

The importance of senior management commitment and participation to a systems development project has been identified by a number of studies (for example: Cerullo, 1980; Watson and Glover, 1989; Watson, 1992; Sauer, 1993; Damodaran, 1996). High levels of senior management commitment and support can avoid user resistance to change (Cooper, 1994), ensure an adequate and timely flow of resources to the project (Sauer, 1993) and reinforce positive attitudes from the staff towards the

[2]A fuller discussion of the rationale is presented in chapter four, section 4.8 of this thesis.

project (Kaye, 1990). It has also been suggested that as well as the support of senior management , the identification of a “champion” for the system can also be crucial in ensuring system success (Lockett, 1987; Beath, 1991).

As a result of senior management being so important to system success, disruptions in management structure or changes in staff may have significant implications for the development project. Should changes in critical personnel and management result in the project losing the support of key management then the likelihood of the project failing increases (Ewusi-Mensah and Przansnyski, 1994). The loss of key management can result in the loss of adequate funding or even the interest of the rest of the management in the project. To combat this downplaying of the project it is important that the system is perceived as valuable by a number of stakeholder groups so the interest is maintained even through personnel changes. It can even be argued that if the project had not generated a feeling of interest across groups that it may be likely to fail even if there are no management changes. Should this occur then the loss of key personnel would simply exacerbate the problems of the system (Ewusi-Mensah and Przansnyski, 1994).

Both Sauer (1993) and Ewusi-Mensah and Przansnyski (1994) have found that senior management have an important role in ensuring a constant and adequate supply of resources to a systems development project. However, they have also noted that a significant factor contributing to the abandonment of information systems has been escalating project costs and completion schedules. These are circumstances when either too much time or money is being spent on the project with no possibility of completion in sight. As the duration of the project drags on so the perceived benefits of the system are questioned. Eventually the project may be abandoned to reduce the loss of resources. This abandonment can be viewed as positive with the resources that have been saved rather than wasted on a project whose completion was in doubt and it gives the organisation the opportunity to learn from its mistakes and avoid them in the future. These results suggest that senior managers are integral in determining the time a systems development project is allowed to achieve its goals and benefits. Clearly the earlier point regarding changes in personnel may also influence management decisions, with new managers being less inclined to devote additional resources to

long running projects.

It has also been shown that the initial stages of a systems development project when the scope, objectives, costs and time scale of the project are defined can be critical to the success of the project (Willcocks, 1994). It is argued that poor decisions at this point can lead directly to project failure. Similarly, unrealistic time scales, unrealistic budgets and over ambitious objectives can lead to corners being cut with regard to user training, testing of the system and user involvement. The loss of these important aspects of the systems development process reduces the chances of a successful outcome.

2.4.2 User Involvement

User involvement has been strongly advocated as one of the key methods to ensure system success for over 15 years. In their comprehensive review of this literature, Ives and Olson (1984) identify 22 separate studies that have addressed user involvement and yet they conclude that *'much of the existing research is poorly grounded in theory and methodologically flawed.'* They argued that, at the time, the relationship between user participation and success had not been adequately demonstrated. Since this research there has been an increase in studies investigating the link between user participation and successful system implementation (for example: Doll and Torkzadeh, 1988; Rousseau, 1989; Jarvenpaa and Ives, 1991) and Tait and Vessey (1988) suggest that user involvement is now held to be one of the most important factors influencing implementation success or failure. However, Hornby et al., (1992) have argued that some system designers may be over-relying on user involvement to address all *'salient organisational and human issues.'* Doherty and King (1998: p43) note that *'it is possible, however, to build a system which is based upon some user wants, but which fails to make a positive contribution to the overall performance of the organisation.'*

The benefits of user involvement have been identified by several researchers. It has been reported that it can be used as a technique to overcome resistance to change (Carnall, 1986); can improve the quality of the system arising from more accurate user requirements (Damodaran, 1996); it can increase user commitment to system

success (Wong and Tate, 1994); and can also lead to improvements in user satisfaction (Wong and Tate, 1994). Furthermore, it has also been noted that not achieving adequate user involvement can result in alienation, non co-operation or overt resistance to a new information system (Newman, 1984). However, there are also a number of potential problems and drawbacks to adopting high levels of user involvement. It has been argued that user involvement may be inappropriate when senior managers have decided to implement a system that will be unpopular with users (Markus, 1983) or should the information system development work require secrecy (Pfeffer, 1981).

It has been reported that frequently senior management have a low appreciation for the need of effective user involvement and as a result the process of involving users usually appears more symbolic than substantive (Davis and Olson, 1985). Conflicts may also occur over the composition of the project team, the users favouring elected rather than selected representatives (Davis and Olson, 1985) and there may be a lack of trust between different user departments (Wong and Tate, 1994) and conflicts of interest that require explicit attention (Carnall, 1986; Boehm and Ross, 1989). Difficulties in communication may also occur in the project team, the users not having prior knowledge of the jargon used by technical experts, that also may require explicit attention from the project team (Wong and Tate, 1994).

There are also a number of user issues closely linked to user involvement that are also considered important to system success. For example, a significant factor identified in the systems development process is the view that is taken of the user by the development team or the organisation. Lyytinen and Hirschheim (1987) note that during information systems development there is often an over concentration on the average users and that variations in skill levels are often ignored. If these variations are not acknowledged then the system runs the risk of being too complicated for some users which may in turn generate negative attitudes towards the system. Similarly, the variations in the user population will have implications for the training and support provided for the system with some users requiring more input than others (Doherty and King, 1997). In the same way that less advanced users may become disheartened in using the system, other more advanced users may become frustrated with the slow

development of the system and lose interest. Both effects would be detrimental to the overall project.

Another factor concerning the user is an assessment of user motivations and needs. It has been argued by Lucas (1975) that it is important to ascertain the degree to which the demands of users will be met and the influence this will have in turn on their level of motivation towards the system. In any system implementation it is clearly important to have user interest otherwise the system will not be used. Similarly, if user needs are not taken into account there is an increased probability of end user conflicts and technical disagreements with the system designers. If end users are expected to simply accept changes resulting from the project, that is end user acquiescence, then there is a greater potential for conflicts or outright resistance during the project development that could result in the decision to abandon the system (Ewusi-Mensah and Przasnyski, 1994).

2.4.3 User Education, Training and Support

The introduction of an information management and technology training and staff development strategy in June 1989, signalled the formal recognition of the importance of user education, training and support in the NHS. At that time there was considerable concern over the piecemeal nature of IT training in the NHS, the low resources that were being devoted to IT training and the low level of IT skills and knowledge among clinical staff and managers (National Audit Office, 1990: p7). Another Audit Office report (National Audit Office, 1996: p42) has also emphasised the importance of training and support as part of the best practice for implementing hospital information support systems and states: *'hospitals should have implemented properly structured and resourced training programmes and support services to ensure that staff make the best use of their computer systems.'* However, despite recognising the importance of user training and support these issues still do not appear to be receiving the attention they require in the health service. For example, a recent Audit Commission report (Audit Commission, 1997: p21) has found that there is still inadequate investment in IT training and support of staff in the community sector.

Several studies have shown that high quality education and training are essential

elements in a successful systems development project and that failing to adequately address training requirements is likely to be detrimental to the overall project (for example: Brady, 1967; Moran, 1981; Miller and Doyle, 1987; Cronan and Douglas, 1990; Hornby et al., 1992). Bronsema and Keen (1983) have suggested that the success of any implementation effort increases substantially if there is a strong commitment to education. Nath (1989) supports this view stating, *'investments in user training pay hefty dividends by making users more satisfied and thus having effective information systems.'* However, despite this literature it is reported that some companies have low information system training budgets and a low number of trainers (Nelson and Chaney, 1987a).

In a separate study Nelson and Chaney (1987b) made a clear distinction between education and training. They suggest that both processes imply a formal transfer of knowledge. However, education involves the understanding of abstract theory while training develops users' practical skills necessary to complete specific tasks associated with the system. Bronsema and Keen (1983) propose a taxonomy of education comprising three elements: concrete experience; abstract conceptualisation; and reflective observation. The first element, concrete experience refers to the actual hands on training that is provided for users whereas the second, abstract conceptualisation, refers to the conceptual issues associated with the system. The third element, reflective observation, refers to a reviewing session for users, reflecting on specific issues associated with the system. Once the education is completed Bronsema and Keen believe a final element, active experimentation, also adds to the education process. Active experimentation occurs as users interact with the system in their normal working environment and attempt to enact the activities and concepts that they have learnt.

Finally, Yaverbaum and Nosek (1992) take both these studies and suggest a synthesising of their concepts. They propose that Bronsema and Keen (1983) have combined the concepts of both education and training under the one heading of education. It is proposed that this merging leads to high quality education and that both training and education are important to system success. Consequently, they suggest that education comprises abstract conceptualisation and reflective observation

while training incorporates concrete experience and active experimentation. Although these studies attempt to separate the two elements of education and training it is suggested that both these elements should be 'delivered' to users during sessions designed to prepare users to successfully interact with the system. Hence, there does not appear to be a conceptual problem in studying both education and training under the one heading of 'user training' so long as the distinction between the two elements is understood and appreciated.

Several studies have shown that user training can provide several benefits for systems development projects. It has been reported that high levels of training have been found to correlate with: high levels of system usage (Fuerst and Cheney, 1982); more positive user attitudes towards the system (Lucas, 1975; Maish, 1979) and improved user perception of job motivation resulting in greater satisfaction (Yaverbaum and Culpan, 1988; Nath, 1989). Similarly, it has also been found that a lack of training leads to less successful implementations (Alter, 1980; Lucas, 1975). It is clear from these studies that there is substantial evidence to support the need for high levels of user education and training during a systems development project.

The importance of user support to systems success has also been recognised in the literature although to a considerably lesser degree than user training. It has been suggested that user support can take three principal forms. It can either be provided through a centralised information centre, through more localised MIS support staff or as informal support from colleagues and lead users (Govindarajulu and Reithel, 1998). It has been argued that a basic goal of information centres is to help users help themselves (Hammond, 1982) and the services offered by these centres are provided across the whole organisation. By contrast local MIS staff exclusively support the users of a specific department and typically report to the department manager and not the IS manager. Finally, informal support is provided by peers, friends and lead users. Lead users have more experience and knowledge of information technology than other end-users and are in many ways ideal for providing support since they have the requisite business and computer knowledge (Rockart and Flannery, 1983).

Several studies have also found that user support, in the form of an information

centre, can influence the level of user satisfaction associated with the system. Bergeron and Berube (1988) reported higher levels of user satisfaction when an information centre was provided and also stated that the centre was rated as the most important source of support for end-users. However, in a later study Nord and Nord (1994) found that a significant percentage of end-users were dissatisfied with the support provided by an information centre, largely due to differences between end-user expectations and actual support received. Consequently, it remains unclear as to the precise value of user support to systems development projects, or the form it should take. This observation suggests that further research is required to investigate the importance of user support to successful systems development projects.

2.4.4 System Testing

Systems testing has long been recognised as an important element to ensure successful systems implementation (Burch and Strater, 1974; Ennals, 1995; Flowers, 1997). As the development process nears completion, it is normal for individuals closely associated with the new system to have a strong desire to implement part or all of the system into the mainstream of the organisation's operations. In order to attain this implementation successfully, however, the practitioner must ensure that the system will perform as designed. Testing the system is an implementation activity that requires careful planning on the part of the systems analyst and must be done on several levels including: testing of a logic module; program testing; string testing; testing the computer system; and systems testing when including all the supporting clerical procedures.

Burch and Strater (1974: p347) identified five reasons why testing, as a major development strategy, is particularly important and these reasons are still relevant for current system implementations:

1. As systems become more integrated within an organisation, it is important that each new system implemented performs successfully initially, not only for its own purposes, but so as not to degrade other existing systems.

2. The increased dependency upon computer generated information, by all levels

of users within an organisation in their decision making and problem solving activities, relates an organisation's performance directly to the systems performance.

3. Increased usage and familiarity with computer based systems has resulted in higher expectations by organisational users of the system.

4. The inflationary trend in the cost of other development activities can be reversed with improved testing procedures.

5. The investment in systems maintenance resources can be reduced with improved testing procedures before the system is installed.

Burch and Strater (1974) also suggest that the systems analyst must look for opportunities to improve the testing procedure for a system and in so doing must employ a great deal of creativity. They suggest that one effective method of improving systems testing is to involve user personnel during testing. The value of this approach has been demonstrated by Chen and Gough (1995) in their study of the implementation of a fully integrated hospital information system in Taiwan. They argue that a critical feature of the implementation was effective testing of the installed system that actively involved the potential users. Approximately two hundred user activities were simulated and a combined group of staff from all relevant departments were used to test each simulation. It is argued that this approach enabled the integrated system to be tested by staff with many different types of skill, from different departments and therefore ensured that the system would be effective across the whole hospital. Consequently, such comprehensive testing approaches are likely to significantly increase the likelihood of a system being accepted within an organisation and therefore the chance of system success.

It should be noted that these best practice variables are unlikely to work in complete isolation and could influence either the adoption of other best practice variables or other issues associated with the CIS. For example, whether there is adequate senior management commitment and participation will influence the resources available to

the project (Sauer, 1993). Should resources not be forthcoming then there may be less training or system testing conducted that would, in turn, have implications for the success of the system. Similarly, Damodaran (1996) argues that to get satisfactory levels of effective user involvement the users have to be trained so that they can make informed decisions. Damodaran suggests that learning opportunities such as demonstrations of similar systems, visits to sites that are using similar systems and discussion sessions are possible approaches to ensuring the users are sufficiently informed to take an active role in the development project.

The previous sections have shown that there is a well-documented body of 'best practice' knowledge that should guide the IS practitioner in the effective development and implementation of information systems. However, there exists a paradoxical situation in that far too many projects still fail, despite the availability of this body of knowledge, which should help to promote success. Why in so many instances should this be the case? It could perhaps be that the advice is either: blatantly disregarded; not universally appropriate; not well disseminated; or not always possible to heed. Alternatively it might be that the adoption of existing best practice guidelines is not, by itself, sufficient to ensure the successful outcome of systems development projects. Consequently, researchers have turned their attention to the level of organisational impact that is engendered by the development, implementation and operation of an information system and how this may influence system success.

2.5 ORGANISATIONAL IMPACT ENGENDERED BY INFORMATION SYSTEMS

A further important strand of IS research concerns the organisational impact of information systems. It has been recognised that the level of penetration and sophistication of information technology is growing rapidly and with this expansion goes a concomitant increase in the level of the organisational impact of information technology. For example, it has been found that the implementation of information systems can precipitate changes in: working practices (Eason, 1988; Hornby et al., 1992); the flow of information (Lyytinen and Hirschheim, 1987; Sauer, 1993); empowerment (Holmes and Poulymenakou, 1996; Wareham et al., 1998); organisational culture (Bufferfield and Pendegraft, 1996; Pliskin et al., 1993);

organisational processes (Lyytinen and Hirschheim, 1987); and organisational structure (Markus and Robey, 1983; Stebbins et al., 1995). Therefore, various researchers have concluded that the need to consider human and organisational issues during a systems development project has become increasingly important (Lucas, 1975; Hornby et al., 1992; Ewusi-Mensah and Przasnyski, 1994; Ahn and Skudlark, 1997).

Given the recognised importance of organisational issues, it is surprising that much recent research suggests that systems development is still 'technology led' (Clegg et al., 1994), that organisational issues are not properly addressed during the systems development process (Clegg et al., 1997a), and that much of the responsibility for this rests with IT professionals (Hornby et al., 1992). Consequently, Doherty and King (1998) call for a broad programme of research, to consider why organisational issues are given a low priority and how their treatment can be best accommodated. In order to understand how organisational issues can be best addressed during the systems development process, two issues need to be considered. Firstly, it is necessary to define what is meant by the term 'organisational issue' and secondly, it is helpful to review the key areas of organisational impact where the treatment of organisational issues may play a key role in ensuring a positive impact occurs.

Although the importance of organisational issues has been recognised in the literature there have been few attempts to explicitly define the term organisational issue. The majority of research has been content with defining organisational issues by providing examples of non-technical aspects of systems development, that may have an impact on the ultimate success or failure of a project (Eason, 1988; Clegg et al., 1989). More recently, Doherty and King (1998) have proposed that these examples can be categorised into three groups: organisational alignment, organisational contribution and human and behavioural issues.

Organisational alignment issues deal with how well the IS fits with the existing organisation. In this category they include organisational structure, power distribution within the organisation, the environment, organisational culture and business process re-engineering. Organisational contribution issues involve the return the information

system is expected to provide to the organisation. Under this heading they include IT strategy, current organisational needs and future organisational needs. Behavioural issues study the interaction between the system and individuals in the organisation. Issues included in this category are user training, the human-computer interface, the re-design of jobs, health and safety issues and user characteristics.

However, although this classification does aid the conceptual understanding of organisational issues, it is still helpful to have a working definition of the term organisational issue. Doherty and King (1997) have defined organisational issues as:

> *Those issues which need to be addressed during the systems development process to ensure that the impacts of the resultant technical system on the organisation and its employees are likely to be acceptable.*

It was indicated in the introduction to this section that an information system can precipitate organisational impacts in six key areas. Each of these areas is reviewed in more detail in the following sections.

2.5.1 Working Practices

There have been several studies that seek to assess the impact on working practices and job design that result from the introduction of an information system (for example: Davis and Taylor, 1978; Hackman and Oldham, 1980; Buchanan and Boddy, 1983; Scott Morton, 1992; Bailey, 1993). Eason (1988) notes that much of the existing literature takes one of two views towards the resultant effects of introducing information technology on jobs. The first view is based on the 'deskilling' hypothesis that computers take work from people, remove any opportunity for them to use their skills and only require them to perform routine, monotonous tasks. In contrast, the second view is the 'enrichment' hypothesis that says computers take over the routine aspects of work freeing people to perform creative roles while being supported by a powerful information handling tool. There is evidence to support both hypotheses and both outcomes have clear implications for system success.

It is noted by Lyytinen and Hirschheim (1987) that the introduction of an information

system may seriously affect a user's job, degrading the work content and lowering the quality of the physical and social work environment. These changes may reduce the motivation of the user to use the system and therefore reduce the success of the system. The user may become less inclined to conscientiously update the system and so reduce the quality and value of information for other users. In contrast, Bjorn-Anderson et al. (1979) reported that the dominant effect of the introduction of computers on bank clerks was an increase in job satisfaction because their jobs had been enriched.

There has also been evidence to suggest that an acknowledgement from the organisation that the system will require job design changes rather than simply being reactive to problems once the system is implemented is likely to considerably increase the likelihood of success. This transition goes hand in hand with the design of the system and relevant training to prepare and help the employees change their working practices. Not adequately planning for changes in job design coupled with incomplete and inconsistent training are thought to have directly contributed to the failure of London Ambulance Service's Computer-Aided Despatch system (Beynon-Davies and Lloyd-Williams, 1999).

2.5.2 Flow of Information

It has been suggested that a system can adequately meet users needs and cognitive styles as well as its organisational task but may still be resisted because of the changes in power distribution that result (Lyytinen and Hirschheim, 1987; Cooper, 1994). The arrival of an IS may cause significant changes in the flow of information and thereby change the accessibility of information to individuals. Certain personnel may lose power, the IS allowing them to be bypassed while others may gain, having greater ease of access to information enhancing their position.

It is argued that power and politics are essential aspects in the nature of organisations and that stakeholder groups should be expected to show attitudes that support not only the organisation but also the group to which they belong (Angell and Smithson, 1991). Similarly, individual's own personal aims and ambitions will also influence the attitudes held by stakeholders within the organisation and towards an IS project.

Consequently, it is vital that both the politics and the power distribution that the IS designers presume to be present matches the actual distribution within the organisation (Markus and Robey, 1983). Should the changes in information flow engendered by the information system be unacceptable to those losing power the project may be resisted as a result (Doherty and King, 1997). It has been suggested that this resistance may cause most damage to a project during the process of IS implementation. Power struggles can result in the withholding of funds, resources and even decisions, all of which can have an adverse effect on a project (Holmes and Poulymenakou, 1996). Consequently, it is vital that developers take into account the changes in the flow of information that will result from the implementation of a new system, in order to avoid resistance and potential damage to a systems development project.

2.5.3 User Empowerment

It has, however, also been shown that changes in power distribution and specifically the empowerment of users can have significant positive impacts on system success. Wareham et al. (1998) describe a how a company that implemented a new control system overcame user resistance through empowering its user staff. The system was implemented with complete technical success but encountered considerable resistance from users. It was not until the management of the company decided to embark on a radical empowerment process and change the management structure from a strictly hierarchical to a team based organisational form that the real benefits of the system were derived.

Similarly, Hammer and Champy (1993) also identify clear benefits from empowering staff in a case study of Mutual Benefit Life. In this case, the president of MBL demanded a 60% productivity improvement which led to the creation of a new job position transcending previous departmental boundaries. The new position was supported by shared databases and computer networks making a vast range of information available to a single person. In addition these new positions had complete autonomy and responsibility for an application from the time it was received until a policy was issued. This process of empowerment had a tremendous impact on operational effectiveness, MBL being able to process applications in four hours (as

opposed to the previous 24), average turnaround being reduced from between 5 to 25 days to between only 2 to 5 days and throughput more than doubling.

Specific benefits of achieving user empowerment have been identified as improving user motivation and performance both of which have positive implications for the information system and the organisation as a whole (Baxter and Lisburn, 1994). Consequently, it is argued that strategic planning in the IS project should be concerned with the empowerment of users giving them access to data, the power to analyse data and the connectivity to share data (Holmes and Poulymenakou, 1996). In a study of midwives as end users during a hospital computer system implementation, Carroll (1997) reported that the process of empowerment was supported with active involvement from key representatives from the user community and through intensive training provided by clinical staff to their colleagues. He considered these methods to be crucial in developing user empowerment but also suggests that effective management of user expectations needs to be adopted to avoid staff becoming frustrated following empowerment. He argues that this management is particularly important in the healthcare sector as hospital systems are frequently lagging behind developments in the private sector and have a more outdated look and feel compared to commercial software packages for home PC users.

However, it has also been noted that not all members of an organisation view user empowerment as a positive step. Some middle management may feel particularly threatened by a policy of user empowerment and may even attempt to resist the process. For example, Klein (1984) questioned 139 supervisors about their employee involvement programmes. She found that, although 72% of supervisors saw the programmes as being good for their companies, only 31% saw them as beneficial to themselves. In an attempt to explain these results, Klein states that job insecurity, work overload and fear of loss of status were major contributors to the resistance of middle managers. Consequently, it appears that although user empowerment has significant benefits for an information system and its host organisation it is a variable that requires careful management throughout all stages of a systems development project.

2.5.4 Organisational Culture

It has been observed that although organisational culture was one of the dominant themes of management literature in the 1980's, it has received comparatively little attention from specialists in information studies (Brown and Starkey, 1994). The literature that has been published has shown that organisational culture can be influential in determining the effectiveness and eventual success of an information system. For example, it has been identified that a crucial element in determining system success is that the presumed organisational culture identified by system designers matches the actual organisational culture to ensure that the system is aligned with the organisation (Pliskin et al., 1993). Walton (1989) argues that at the most basic level, the impact of IT on culture can be seen as having the potential to facilitate empowerment or be used as a control tool.

Pliskin et al. (1993) note that the term 'organisational culture' has been conceptually difficult to define because there are numerous definitions. Davies (1988) suggests that the literature can be divided into two approaches. The first approach takes a descriptive, interpretive or anthropological approach. This approach attempts to understand how culture is represented in organisations and no efforts are made to use this knowledge to manage or alter the culture of the organisation. In contrast, the second approach takes a more functional view and is concerned with the management and control of culture. This approach adopts the perspective that it is useful to study the culture of an organisation, through observing informal needs and behavioural characteristics and that this knowledge and understanding can help when managing or attempting to improve the performance of an organisation. Pliskin et al. (1993) propose that the latter approach is appropriate for studying the effective implementation of information systems in organisations and the same view is taken for this research project.

For the purposes of this research project the definition of culture is taken from the work of Sathe (1985) who describes culture as:

> *'The set of assumptions, beliefs and values, often unstated, that members of an organisation share in common.'*

The assumptions that Sathe identifies refer to the effects of groups of people sharing common experiences such as problem solving. The shared beliefs of people encompass their common understanding of facts about the world and cause/effect relationships. Values are basic assumptions about which ideals are desirable or worth striving for. Pliskin et al. (1993) suggest that these values may not reflect what people actually want or desire but what they believe they ought to want. In so doing, values represent desirable ultimate end states.

It has been shown that organisational culture can have a variety of possible effects on a systems development project. For example, culture can be a source of discontent with the different sets of beliefs held about technology and IS by different stakeholders causing tension between the different groups. This tension can create culture gaps within organisations. There may be culture gaps between users and developers and between managers and developers at different levels. The resulting tension among users, developers and those expecting a return on investment in the system may lead to dissatisfaction in all the groups (Taylor-Cummings, 1998).

In addition, it has also been argued that many organisational cultures have a fortress mentality because of a sense of paranoia or well founded fears about information systems (Burch and Grudnitski, 1989). For example, people may have been hurt while trying to co-operate or attempting to do something positive. Following a bad experience people often reinforce each other in their negative views. Similarly the organisation may try and resist change forming an instant dislike towards new systems and resulting changes in working practices. There is often a fear that the new information will be used against them or managers will dislike a system that removes their excuse for making poor decisions (Kilmann, 1983). To overcome these difficulties for information systems it is recommended that the systems users are involved in the development and thereby develop systems that perform as people want rather than people performing as the system wants (Burch and Grudnitski, 1989).

Other methods that have been proposed to ensure that organisational cultures have a

positive relationship with the implementation of an information system are:

- Negotiative rather than directive approaches to the process of implementing change (Barrett, 1992);
- The creation of a climate in which learning and innovation are encouraged and valued (Barrett, 1992);

- Top management paying careful attention to the role of IT in improving operations, communications and control thereby promoting a culture more conductive to organisational effectiveness (Morieux and Sutherland, 1988) and;

- Ensuring that system designers are aware of the culture of the organisation that will be the host for the information system and that they are sensitive to culture and view it as a binding constraint on IS implementation (Pliskin et al., 1993).

However, it is suggested that studies of the impact of organisational culture on IS and the implications for the success of the system have still received relatively little attention in the existing literature. Organisational culture is still considered to be difficult to manage and has been identified as a source of resistance from end users (Pliskin et al., 1993; Loeb et al., 1998). Therefore, there is a need for additional research regarding organisational culture, its implications for system success and the possible management practices that may be adopted to improve the likelihood of system success.

2.5.5 Organisational Processes

Increased world-wide competition has been forcing all companies to critically reappraise their operations and procedures to identify strategies to improve their performance and to establish and maintain a competitive edge. Frequently, organisations have looked to improve their performance by introducing information technology to automate existing processes, or by incrementally identifying and implementing improvements to their processes. Whilst such strategies often bring some benefits they leave the organisation’s underlying structures, processes, working practices and culture largely intact. Alternatively, organisations can go down a more

radical path and employ business-process re-engineering (BPR). This approach encourages organisations to critically question how and why they do what they do, in order to identify areas where dramatic improvements in their levels of performance can be achieved.

BPR has been defined by Hammer and Champy (1993) as 'the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical measures to performance, such as costs, quality and speed'. Consequently, BPR is presented as a radical philosophy, with which an organisation can realign its vision for the future. It has been argued that IT is the key element best placed to support this radical philosophy (Davenport, 1993) and Fielder et al. (1994) state that, 'IT-enabled BPR is a means of levering the power of IT to change organisational processes radically resulting in substantial improvements in corporate efficiency and effectiveness.'

Although BPR is clearly an exciting new approach there is still a great deal of debate as to whether its application is likely to lead to sustainable commercial benefits. Hammer and Champy (1993) have quoted the experiences of several US companies who have all benefited from the introduction of BPR programmes. However, Morgan (1994) has noted that *'up to 70 percent of re-engineering effort fails to achieve results.'* Indeed, even two of the original leaders of the re-engineering crusade, Michael Hammer (Hammer and Stanton, 1995) and Robert Davenport (Davenport, 1996) are now conceding that in many cases BPR has failed to deliver.

IT-induced changes in organisational processes have also been identified, prior to the advent of BPR as potentially having negative as well as positive effects. These changes may not be desirable in terms of the processes of the organisation because they may result in reductions in human contacts, the introduction of added bureaucracy and/or strengthening organisational rigidity. Consequently, these undesirable aspects of IT-induced changes in organisational processes may reduce the perceived success associated with the new information technology in the host organisation (Lyytinen and Hirschheim, 1987).

2.5.6 Organisational Structure

It has been noted that the implementation of IT can have a significant effect on the structure of an organisation (Stebbins et al., 1994; Raymond et al., 1995) and its internal dynamics. Scott Morton (1992) has argued that the successful application of IT will require changes in management and organisational structure. He states that organisations have always managed some form of matrix structure comprising of functions, products markets and geography in some combination. The introduction of IT has meant that the unit co-ordination costs of managing such matrix structures are declining and IT is facilitating increased economies of scale. Consequently, smaller organisations are now also able to be low-cost producers and IT is enabling the break-up of traditional organisational forms. Similarly, the introduction of IT can either lead to more centralised or decentralised organisations or some combination of both (Clegg, 1994). Further research has indicated that IT has enabled the development of more flexible organisations (Atkinson, 1984) and IT's ability to affect co-ordination by shrinking time and distance permits an organisation to respond more quickly and accurately to the marketplace (Scott Morton, 1992). This ability not only reduces the assets the organisation has tied up but also improves quality as seen by the customer. These changes may allow an organisation to continue to be competitive in a dynamically changing world.

Croswell (1989) supports the view that in order to reap the rewards of technology there is usually a need to modify organisational structures but also warns that such changes may be viewed with scepticism in organisations where traditional top down management practices exist. It has been noted that an information system can create all sorts of changes or modifications either directly or indirectly and therefore have implications for the power distribution and policies of the organisation (Ewusi-Mensah and Przasnyski, 1994). Consequently, Kramer et al. (1992) suggest that the switch over must be carefully planned and realised through investment in education and training of staff at all levels. However, should these changes in organisational structure not be accepted by stakeholders then the project is more likely to be viewed as a failure (Doherty and King, 1998).

Pioneering research studying the links between technology and organisational

structures and processes was conducted by Woodward (1965) and Hickson et al., (1966). However, despite this work Child (1987) notes that many years later, *'the absence of a well-developed theory of organisational design and technology remains a problem.'* Clegg (1994) supports this view and consequently, it would appear that there remains a need for further research to study the relationships between information technology and changes in both organisational processes and organisational structure.

The previous sections have provided strong evidence to show that information systems are having a significant impact on their host organisations. Furthermore, recent research (Doherty and King, 1998) also suggests that the organisational impact of systems is gradually increasing. Venkatraman (1991) suggests that there is a direct relationship between the level of organisational impact and the resultant level of organisational benefit; the higher the impact, the greater the potential benefit. However, to date, little empirical work has been conducted to explore this relationship. The NHS has experienced large investment in complex integrated information systems over the last ten years and many healthcare organisations are likely to have experienced considerable organisational impact. Consequently, the NHS provides an excellent research context to study the relationship between the organisational impact engendered by an information system and its success.

2.6 THE UK NATIONAL HEALTH SERVICE (NHS) CONTEXT

One sector which has enjoyed high levels of investment in information technology, yet failed to fully reap its benefits, is the National Health Service (NHS) in the United Kingdom (National Audit Office, 1990). The recognised importance of IT within the NHS stems from the mid 1980s, with the publication of the inaugural national strategy for IT (Department of Health and Social Security, 1986). Since then there has been a headlong drive for improvements in the quantity and quality of information, resulting in millions of pounds being invested in IT (Keen, 1994). In 1990, however, a National Audit Office report (National Audit Office, 1990: p3) concluded that: *'The management of computer systems [within the NHS] was often weak, with many failures to follow good practice, resulting in poor value for money'*. In order to arrive at these disconcerting conclusions, the same report had assessed eleven NHS

computer projects on five key features of best practice, and had found that the major shortcomings included: *'incomplete feasibility studies; loose contractual arrangements; inadequate planning; weak control and an absence of post-implementation reviews'*. More recently, this appraisal of the situation has been supported by Clegg et al. (1997a: p862) who conclude*: 'The health sector is still seen as performing rather poorly in the field of IT'*.

This section discusses the key developments in the NHS over the last 10 years and the role of Community Trusts. The information requirements for the NHS and the community sector in particular are then reviewed as is the use of information systems in the NHS. Finally, a brief discussion is provided concerning the history and use of community information systems and levels of performance currently associated with them.

2.6.1 Key Developments in the NHS 1989 - 1999

Since the beginning of the 1990's the NHS has experienced dramatic structural and organisational change. For the previous forty years of its existence the NHS had been based on a highly bureaucratic and centralised structure with the Department of Health at its centre and the health minister in a position of overall control and responsibility. The service was based on 14 regional health authorities (RHAs) in England, that in turn oversaw 192 district health authorities (DHAs) (Dent, 1996). Prior to 1991, both RHAs and DHAs were responsible for the management and financing of all publicly controlled hospital and community health services. The Department of Health would allocate funds to the RHAs for the running and capital costs of the services and the regions made further allocations to the DHAs.

In many respects the NHS can be viewed as a successful institution prior to the reforms that were outlined in the 1989 White Paper, Working for Patients. It provided universal access to healthcare, allocated on the basis of need and was relatively cheap to provide, the administration costs being estimated as one third of those in the United States (Himmelstein and Woolhandler, 1986). However, despite its relative success the NHS was still troubled by a number of problems that intensified in the 1980's, the key issue being the ever rising level of spending associated with the service. The

Conservative government at the time was greatly concerned at the level of public expenditure and was determined to attempt to control the escalating costs of the NHS. Despite this intention, real spending on healthcare continued to rise throughout the decade, although critics would argue that this was still insufficient to cope with the growing demand from demographic change and technical developments in health care delivery (Robinson and Judge, 1987). Consequently, in 1988 the government established an internal Review whose underlying philosophy was that rather than injecting more money into the service, the way to meet growing demand was to increase productivity through reforming the way the service was both managed and organised (HMSO, 1989).

The key elements that emerged from the White Paper, Working for Patients were the introduction of an internal market for the health service subject to state regulation and split between the purchasing and provision of health services mediated by contracts. The main purchasers would be the DHAs acting on behalf of their population and volunteering General Practitioners (GPs) who would be empowered to control their own budgets and negotiate their own contracts. The providers would be NHS units at ground level, freed from the control of DHAs and allowed to become 'self governing' Trusts. The transition to Trust status frequently involved the creation of a Board of Directors and a move towards a structure of management more akin to the private sector (Ferlie et al., 1996).

The reforms were introduced in 1991 and in April 57 NHS Trusts and Units became self-governing Trusts, 306 GPs became fundholders and all districts separated their purchasing and providing functions. A second wave of 99 Trusts and GP fundholders joined the first group in 1992. It is suggested that by the end of 1991 there was evidence to show a change in the culture of the NHS as a result of the reforms. A greater focus was being given to the performance related parts of contracts and GPs were noted as providing a greater range of services including health promotion clinics and minor surgery (OECD, 1992). However, Litwinenko and Cooper (1994) argue that the change in culture was also having detrimental effects undermining the traditional cohesion and customs of the NHS. They state that the culture within NHS organisations was becoming more concerned with power and control with individuals

becoming increasingly subordinate to the organisation.

The early 1990 reforms of the NHS were to continue to be questioned until 1997 when a change in government prompted further developments in the organisation and management of the NHS. In December 1997 the new Labour government published a White Paper, The New NHS: Modern Dependable, detailing its intention to remove some of the key elements introduced in 1991. The White Paper indicated that both the internal market and the GP fundholding scheme would be abolished from April 1999. It was proposed that a new system of commissioning would be introduced to replace the internal market that would emphasise the importance of partnership and performance rather than competition. The core of these new commissioning arrangements were to be Primary Care Groups and Trusts (PCGs/PCTs). Each GP Practice in England was to become part of one of the 481 PCGs from April 1999 each covering a population of between 50,0000 and 220,000 patients (Department of Health, 1997).

From April 1999 Primary Care Groups were established at one of four possible levels. The first level groups are intended to support the Health Authority in commissioning care for its population acting in an advisory capacity. The second level PCGs take greater responsibility for managing the budget for healthcare in their area, acting as part of the DHA. The third level is a Primary Care Trust, a free standing body accountable to the DHA for commissioning care and the fourth level involves additional responsibility for the PCT in the provision of community health services.

The first PCTs are expected to be created from April 2000 although at the time of writing there is uncertainty over the precise governance arrangements for these organisations (McIntosh, 1999a). This uncertainty is mirrored in other organisations, particularly for DHAs and existing Community Trusts that are having to reassess their roles in healthcare management and provision. The DHAs are expected to provide strategic leadership in the development of primary health care and ensure quality is maintained in the delivery of care, but ensure that they do not cramp the freedom that PCTs are expected to have in developing innovative practice (McIntosh, 1999b). However, Community Trusts are facing even greater uncertainty. When level four

PCTs are finally created there will be a clear conflict between whether the traditional Community Trust or the new PCT assumes total responsibility for the provision of community services in the same area. The arrival of PCTs, viewed as the new government's solution to the provision of primary care in an efficient and effective manner, may well signal the end of many Community Trusts in their current form.

2.6.2 Community Trusts in the NHS

Community Trusts are primarily concerned with meeting the healthcare needs of people who live at home and do not require the services of acute hospitals, although many provide inpatient services in local community hospitals. The geographic area that Community Trusts cover is often very large and community health staff operate from many different locations such as health centres, GP practices and community hospitals. Most Community Trusts deliver more than 20 different services including district nursing, health visiting, physiotherapy, occupational therapy and speech and language therapy and interact with a wide range of patient groups.

Commonly, the largest staff groups associated with Community Trusts are based around nursing services. District Nurses[3], Health Visitors[4], and School Nurses[5] provide nursing skills, health information and practical assistance aiming to enable people to take part in their own health care (Department of Health, 1989). These professional groups work closely with other professionals such as midwives, social workers and general practitioners forming a network of care and support for their local population.

Recent developments in community healthcare have seen the emergence of multi-

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[3]District Nurses nurse people where they live in the community. Patients can request care, or may be referred by GPs or hospitals. District Nurses may cover a particular geographical area or a GP practice list.

[4]Health Visitors promote health by teaching in the home, in the classroom, or in a variety of informal groups. They may cover a geographical area or a GP practice list. A major responsibility is to ensure that infants have a healthy start in life and Health Visitors help prepare parents for birth and visit them afterwards to offer help or information about feeding, general health and safety, the infants need for stimulation and normal child development.

[5]School Nurses are concerned with the health of children and adolescents in schools. They monitor the development of children, and teach them about health issues.

disciplinary teams working in the community often integrated with general practices. An Audit Commission Report (Audit Commission, 1997) notes that in order to ensure the continuing development of staff roles, their organisation and management, and the effective provision of services there is a need for good information. However, the report also states that '*Most Community Trusts are desperately short of reliable data for health professionals to use when caring for patients and for managers to use when planning and monitoring the services that they provide. This undermines Trusts' ability to manage the complex range of services they deliver'*. Consequently, there exists a clear demand within the community healthcare sector for accurate, timely information for both health care professionals and managers.

2.6.3 Information Requirements in the NHS

The use and development of information systems in the NHS have developed in similar ways to many other organisations. Basic data processing exercises such as payroll and general ledgers were the first to be computerised and the use of computers in patient administration appeared in the early 1970's. The high level of investment required for the development of patient administration systems (PAS) encountered considerable resistance as it put an additional drain on resources that could be used in direct patient care. However, the three initiatives of Körner, Resource Management and the 1989 NHS reforms have led to increased requirements for information systems.

Prior to 1982, there was no co-ordinated information gathering taking place in the NHS that allowed the monitoring of standards. Little importance or value was associated with the collection of clinical data and there was little information available for clinical staff and managers to use to make decisions. This problem was highlighted by a Royal Commission Report (Merrison, 1979) that concluded, '*the information available to assist decision makers in the NHS leaves much to be desired. Relevant information may not be available at all, or in the wrong form. Information that is produced is often too late to assist decisions or maybe of dubious accuracy.'* However, it was not until 1984 that a government steering group, chaired by Edith Körner, was established to address the issue of information provision in the NHS.

The Körner initiative was a result of the desire to provide comparative information on

performance across the NHS. The committee produced 6 reports detailing information requirements for the different sectors of the NHS. The information requirements were predominately concerned with health promotion, prevention and resource allocation and the data set was implemented in the late 1980's. Although helpful to the Department of Health the value of these central returns to clinicians and local health management have been questioned (Gowing, 1994).

The data collection for the Körner returns is essentially based around the number of contacts made between healthcare professionals and their patients. These contacts are collated every month and returned to the Department of Health on an annual basis. One contact simply represents a single patient/health care professional interaction. No details are recorded concerning the type of care delivered, the time it took or the skills involved. Hence, there was no way of differentiating between cases. Consequently, the information that was available could only provide a very limited insight into how care was delivered. It was possible for a district nurse to administer injections to 50 people in a morning clinic and the next day be required to spend the morning treating a dying elderly person, providing drugs, counselling the family and arranging additional care. The information recorded would simply state that the nurse had made 50 contacts on the first morning and one on the second.

The Resource Management Initiative (RMI) was mainly concerned with acute hospitals and bringing doctors, as major initiators of resource usage, into the management process. For the initiative to succeed it was realised that improvements were required in the current management information. The systems required to support the RMI had to be linked to a variety of areas such as laboratory, theatres or radiology and also to financial systems. Consequently, the initiative put pressure on health care units to develop suitable information systems that were capable of producing the required information for management.

The third initiative that required support from suitable information systems was the introduction of contracting following the 1989 NHS reforms. The concept behind the reforms was a split between purchaser and provider organisations contracting with each other for the provision of healthcare services. The contracting process generated

three new demands for information as noted by Gowing (1994: p33):

'Therefore, with contracting came the need for:

1. *Improved definition of what services are available and provided, stated in terms of what the service is, how much is provided and at what cost.*
2. *Understanding, monitoring and management of volumes and types of activity undertaken within the contracts.*
3. *A reduction in the reporting time cycle so that data are available speedily, in as accurate and reliable a manner as possible and in a form suitable for analysis and presentation to enable the business to operate effectively against contract'.*

These demands meant that providers had to invest in sophisticated and robust operational computer systems and has increased the role of IS in provider management.

In the early days of contracting the only nationally agreed data set available to support the contracting process was the Körner data set. However, this was immediately identified as insufficient to allow the internal market to operate effectively. This problem was addressed by the project responsible for the information aspects of 'Working for Patients' which recommended the adoption of the concept of new nationally agreed data sets to be known as Contract Minimum Data Sets (CMDS). The new data sets were, like Körner, focused on specific areas of health care, such as the Community and Maternity Contract Minimum Data Set. They were intended to be far more detailed and comprehensive than Körner and provide information that would be useful to both clinicians, local Trust management, local health authorities and the Department of Health. The new data set was planned for implementation in 1995 but encountered a series of obstacles including doubts over its value to purchasers. Consequently, the implementation date was put back to April 1997. Further consultation with the NHS has resulted in the proposed Community and Maternity MDS being put under review again with the preparation of business cases and implementation plans to be completed by the end of March 1998. The Review Report produced in April 1998 reinforced the view that a Community and Maternity MDS

would not be appropriate in its proposed form and with the abolishment of the internal market the data collection in the NHS should have a far greater clinical focus.

2.6.4 Information Systems in the NHS

The need for an information strategy in the NHS was first acknowledged in 1986 with the publication of the inaugural national strategy for IT (Department of Health and Social Security, 1986). Since then there has been a gradual increase in the development and use of information and information technology in the NHS. Similarly, the levels of investment in IT have also increased to substantial levels, the NHS spending £609 million in 1992 (Willcocks, 1994). However, in 1990 a National Audit Office report (National Audit Office, 1990) stated that the management of computers systems in the NHS was generally weak and was characterised by a failure to follow best practice. Since this report further developments in IT in the NHS have met with mixed results and high profile failures have continued to occur. For example, in October 1992 the new computerised dispatch system at the headquarters of the London Ambulance Service (LAS) failed and as a direct result the lives of twenty to thirty people were lost (Beynon-Davies, 1995).

Since the mid-1980's there have been a series of initiatives designed to encourage the use of IT in order to improve operational performance. The longest running has been the Hospital Information Support Systems (HISS) initiative launched in December 1988. The initiative was intended to investigate how integrated computer systems could be used to provide the information necessary for the efficient and cost effective running of acute[6] hospitals (Dent, 1996). A series of projects to implement highly integrated information systems were funded by the HISS initiative in several major hospitals designed to promote best practice and disseminate lessons learnt. However, the success of this initiative and the projects associated with it have been far from complete. For example, a National Audit Office Report (National Audit Office, 1996) indicated that many of the projects had encountered significant problems during their development and implementation and had been slow to deliver benefits.

[6]Acute services refer to medical and surgical treatment and care mainly provided in hospitals.

Similar initiatives were also introduced in the community sector the most prominent being the Community Information Systems for Providers (CISP) project started in 1991. CISP was part of the National IM&T Strategy for the NHS and it had three main objectives:

1. To support the delivery of seamless and integrated patient care through the effective use of IM&T by organisations providing community based healthcare;

2. Through demonstrating possibilities and options, supporting local good practice and setting standards where nationally appropriate; and

3. By nationally supporting, facilitating and disseminating local work throughout the NHS.

CISP had three main phases during its programme of work that came to an end in 1996. The first phase was concerned with interpreting the White Paper Working for Patients, IM&T requirements for the community sector and evaluating existing information systems. The second phase involved the creation of several beacon sites for demonstrator systems development and ran between 1992 and 1994. The third and final phase continued the demonstrator projects and concentrated on disseminating the lessons learnt from these projects. Throughout all the phases the CISP project led the work in developing a clinically relevant contract currency for community health services although little actual change resulted from this work. The CISP project was also involved with the ill fated Community Contract Minimum Data set project and actively promoted the development of care objectives, care programmes and care packages to encourage a transition from block contracts to person-based contracting (Hartshorn, 1995).

However, despite the efforts of the CISP project the successful development and use of information within the community healthcare sector has been limited. In contrast to the acute sector, there has been relatively little investment in IM&T for community services (Dent, 1996). An Audit Commission Report (Audit Commission, 1997: p18)

stated that *'on average acute Trusts spend 1.8 per cent of revenue on information technology systems and staffing , compared to 1.4 per cent by their Community Trust counterparts.'* The report also emphasises that due to the geographical spread Community Trusts have to invest more heavily than acute hospitals to develop extensive IT networks if their information systems are to be effective. Consequently, many existing information systems in Community Trusts are frequently based on obsolete technology, require manual data input and do not enable clinical staff to produce information to review or improve the care they provide (Audit Commission, 1997).

2.6.5 Community Information Systems

The Körner initiative in the 1980's provided the first major driver for the implementation of computer based information systems in community units. The systems implemented in the late 1980's were principally concerned with meeting the requirements of the Körner data collection standards rather than the requirements of local managers and clinicians. Consequently, many of these first generation community information systems (CIS's) have considerable drawbacks. For example, they are not patient-focused, easy to use, or flexible and many of the systems adopted were not designed to be used in the community sector (Sakutukwa and Adams, 1994).

In 1990 the white paper 'Working for Patients' highlighted the need for 'all community health services providers to have computerised information systems as soon as practicable and for existing systems implementations to be completed and made to work well' (Department of Health, 1990). More recently, an Audit Commission report (Audit Commission, 1997) stressed the need for such community information systems (CIS) to be patient-based to support clinical decision-making, as well as supporting administrative and contract management activities. Unfortunately, the same report (Audit Commission, 1997) noted the 'ineffectiveness of information systems' within this sector. More specifically, it noted that: 'most information systems provide only limited support to front-line staff'; 'many systems are out-dated and badly designed' and 'the introduction of technology is usually badly planned'. In a similar vein, the recent NHS IM&T Strategy (Burns, 1998) also identifies failings in existing community information systems stating that 'the inadequacies of information systems to support community health staff have been apparent for many years'.

However, the need to provide national data sets was not the only driving force behind the implementation of CIS's. The NHS Management Executive actively encouraged the development of information systems that were in line with the core elements of the NHS Information, Management and Technology (IM&T) Strategy. These elements were that the system should be person based, provide data derived from operational information as a by product, be integrated within and between organisations and secure in terms of confidentiality in the collection, handling and transmission of data.

Despite being underfunded in terms of information technology and the rather bleak picture painted by the Audit Commission, some Community Trusts have still managed great strides in the last ten years in developing CISs to support the delivery of healthcare. However, existing research has tended to focus on the acute sector because IT has traditionally played a greater role in this environment (Dent, 1996). With the increasing prominence of primary healthcare through the latest National NHS IM&T Strategy and rising levels of IT investment in the community health care sector there is a need for independent research on the extent of information system use in Community Trusts. In addition, the fact that the experience of information systems in the NHS in general, and Community Trusts in particular has been mixed, with several high profile instances of failure, makes the NHS a valid research context to examine the factors that influence IS success

2.7 SUMMARY

This chapter has reviewed the existing literature that has studied IS success and failure and how it can be measured. It has also studied two key areas that are considered to have particular influence over information system success namely, the adoption of best practice and the level of organisational impact engendered by the information system. The review has indicated that while there is a substantial body of knowledge with regard to best practice the incidence of systems failure and systems under-performance remains stubbornly high. The review has also indicated that there is a lack of research exploring the relationship between organisational impact and success and the methods that can be used to assess and effectively manage these

impacts. This research helps to fill these gaps by investigating the development, implementation and operation of community information systems in the NHS. The final section of the review demonstrates that the NHS is a particularly large and complex organisation, that is fast moving in terms of its IT uptake, has set ambitious goals for its use of IT and has had a range of experiences of implementing and using IT. Consequently, it is argued that the NHS presents an excellent research environment for this study. The following chapter discusses the gaps in the existing literature in more detail and presents the study's preliminary research objectives and framework.

Chapter 3: Research Design

3.1 INTRODUCTION

This chapter provides a methodological overview of the investigation. It presents a critical review of the major research strategies used in the field of IS research and highlights the choices that have been made in the selection of an appropriate research strategy. The philosophical perspective of the research and the methods chosen to investigate the research objectives are described, as are the attempts to ensure valid and reliable findings. The limitations of the research design and problems faced in conducting this research are also explored.

3.2 RESEARCH STRATEGIES

Before describing the chosen research strategy for this study some of the most common IS research strategies are reviewed and their advantages and limitations explained as they relate to this research. Several reviews have been conducted that critically assess the range of research strategies open to IS researchers (for example: Hamilton and Ives, 1982; Vogel and Wetherbe, 1984; Farhoomand, 1987). One of the most common reviews cited in IS research is the work of Galliers (1992). In this work Galliers identifies eight major research strategies currently being applied in the information systems field. In the following sections, each of these strategies is

reviewed, although the final two strategies (surveys and case studies) receive greater attention because of their importance to this study.

3.2.1 Laboratory Experiments

According to Galliers (1992), the most significant characteristic of laboratory experiments is the identification of the precise relationships between variables in a designed, controlled environment using quantitative analytical techniques. This is done with a view to making generalisable statements applicable to real world situations. The major strength of this method rests in the ability of the researcher to isolate and control a small number of variables that may then be studied intensively. The major weakness of this approach is the limited extent to which identified relationships exist in the real world. In addition, much of the research undertaken using this method utilises students as surrogates for real decision makers, thus adding to the sanitised nature of the laboratory situation.

3.2.2 Field Experiments

Field experiments are an extension of laboratory experiments, attempting to construct an experiment in a more realistic environment (Galliers, 1992). The strengths and weaknesses are similar to those encountered in laboratory experiments but an additional weakness is a difficulty in finding organisations prepared to be experimented on. Furthermore, replication is problematic, in that it is extremely difficult to achieve sufficient control to enable replication of the experiment with only the study variables being altered.

3.2.3 Forecasting / Future Research

Forecasting relies on statistical techniques such as regression analysis (Draper and Smith, 1981) and time-series analysis (Chatfield, 1984) to extrapolate likely future trends from past data. Conversely, futures research is concerned with *the 'emergence of new social forms and behaviours, and the development of the so-called information society or information age'* (Vitalari, 1985). It is therefore a particularly appropriate approach when investigating the future societal impacts of information technology.

Strengths of the forecasting method include the ability to provide insights into likely future occurrences, but these insights are dependent on the precision of past data in

the one case and the expertise of the scenario builders on the other. Other limitations relate to the unpredictability of environmental factors and the problems associated with self-fulfilling prophesies identified by Checkland (1981) who stated, *'Predictions on the outcome of observed happenings in social systems may change the outcome. Physical systems cannot react to predictions made about them; social systems can.'*

3.2.4 Simulation

Simulation is a method 'used to solve problems which are difficult or impossible to solve analytically by copying the behaviour of the system under study by generating appropriate random variables' (Chatfield, 1988). Its strengths are associated with these particular situations. It weaknesses relate, as in the case of laboratory and field experiments, to the difficulties associated with devising a simulation that accurately reflects the real world situation it is supposed to replicate.

3.2.5 Phenomenological Studies

Vogel and Wetherbe (1984) argue that phenomenological studies are based more on opinion and speculation rather than observation and place a greater emphasis on the role and perspective of the researcher. Galliers (1992) notes that this sort of research strategy tends to be a more free-flowing process (i.e. less structured) and is more likely to be an individual rather than a group activity. This kind of creative process makes a valuable contribution to the building of theories which can be subsequently tested by more formal means. Its strengths lie in the creation of new ideas and insights. Its weaknesses arise from the unstructured, subjective nature of the process.

3.2.6 Action Research

It has been suggested that the action research approach might be seen as a subset of the case study and field experiment categories (Antill, 1985; Wood-Harper, 1985). However, the underlying philosophy of this approach sets it apart from the more scientific approaches. This underlying philosophy relates to the fact that action researchers know that their very presence will affect the situation they are researching. Indeed, their role is to actively associate themselves with the practical outcomes of the research in addition to seeking to identify theoretical outcomes

(Foster, 1972). In addition, the roles of subject and researcher can easily be reversed at times during action research studies (Clark, 1972).

The strengths of this form of research include very practical benefits that are likely to accrue to client organisations as a result and the fact that the researcher's biases are made overt in undertaking the research (White, 1985). Its weaknesses include the fact that its application is usually restricted to a single event/organisation and consequently, there are problems associated with making generalisations from individual studies (Spencer and Dale, 1979). Other limitations of the approach include the different interpretations and lack of control over individual variables resulting in difficulties when attempting to distinguish between cause and effect. This approach also places a great deal of responsibility on the action researchers, who must be aware that in certain circumstances they could align themselves with a particular grouping whose objectives are at odds with other groupings. The ethics of the research must therefore be an important consideration.

3.2.7 Surveys

Survey research looks at a particular phenomenon by means of a questionnaire or interview (Leedy, 1974). It involves obtaining information directly from participants by posing questions to them. The researcher's task is to collect information relating to the variables and based on the information gathered, to examine the patterns of relationship between the variables based on the responses presented at the time the question is asked (Dane, 1988). Survey research normally deals with studies on how people feel, perceive and behave and the object is to determine how these variables are related (Wiersma, 1991).

Galliers (1992) argues that surveys are a good means of looking at a far greater number of variables than is possible with experimental approaches. They can therefore provide reasonably accurate descriptions of real world situations from a variety of viewpoints. Given large sample sizes, generalisation of the results may also be less of a concern. However, there are a number of drawbacks in survey research. Little insight is usually gained regarding the causes or the processes behind the phenomenon under study. Furthermore, there is also the possibility of bias on the part

of respondents, because they will be self-selecting, on the part of the researcher and due to the point in time that the research is undertaken.

3.2.8 Case Studies

Case study research involves a small number of samples or 'cases'. It involves in-depth analysis through interviews or group discussions of a number of cases from which conclusions are drawn. Case study research is very relevant in studies that focus on the understanding of areas of organisational functioning that are not well documented and are amenable to investigation through contact with the organisation (Bryman, 1989). It is best used in studies that require deeper understanding of how things happen rather than testing relationships between them (Gordon and Langmaid, 1988).

The strengths and weaknesses of case study research have been discussed at length in the IS literature (for example: Kraemer and Dutton, 1991; Lee, 1991; Mumford, 1991; Orlikowski and Baroudi, 1991; Visala, 1991; Galliers, 1992;). Lee (1989) identifies four significant problems with case study research these being a lack of controllability, deductibility, repeatability and generalisability. Galliers (1992) notes that case studies are usually restricted to a single event or organisation and that it is difficult to collect similar data from a sufficient number of similar organisations making it difficult to generalise from case study research. In addition, the data collection and analysis processes are both subject to the influence of researcher characteristics and rely heavily on the researcher's interpretation of events, documents and interview material (Darke et al., 1998). However, these problems are not insurmountable (Lee, 1989) and can be mitigated to some extent if a careful and rigorous methodological approach is adopted.

The summary provided above helps in identifying the choices available in the selection of an appropriate research strategy. However, it must be noted that researchers are not restricted to adopting a single research approach, as there is also the option of combining methods. In particular, there is much value in combining qualitative and quantitative research methodologies as discussed below.

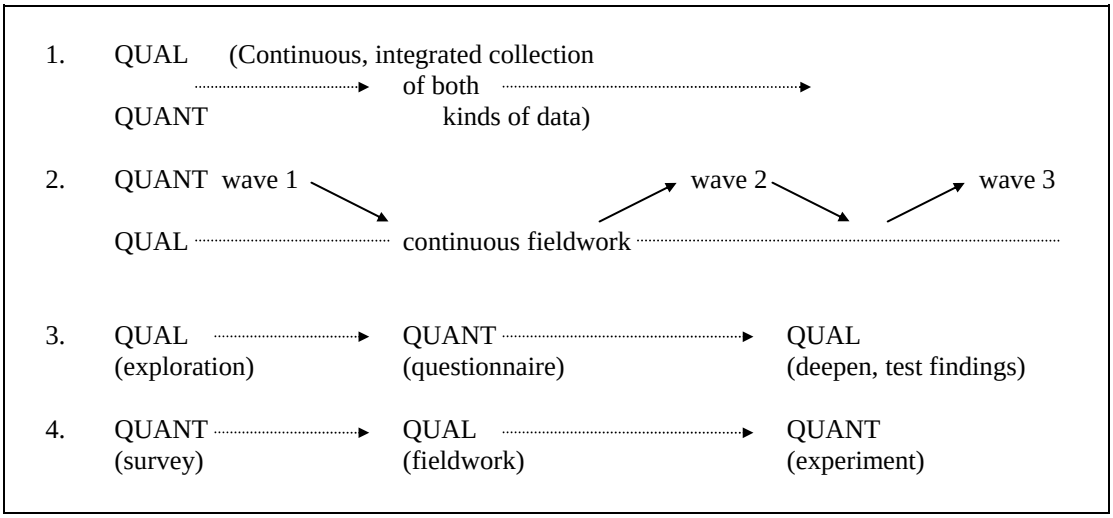
3.3 COMBINING QUALITATIVE AND QUANTITATIVE RESEARCH STRATEGIES

It has been argued that combining qualitative and quantitative research methods in IS research can prove useful in building a wider picture of the phenomenon studied (Reichardt and Cook, 1989), can enable the validation of findings (Jick, 1979) and can help in explaining diverging results (Trend, 1989). Miles and Huberman (1994) suggest four possible research designs that employ both research methods. These methods are shown in Figure 3.1.

The first design involves both quantitative and qualitative data being collected together at the same time. The second design employs a multi-wave survey, conducted in parallel with continuous fieldwork. The first survey wave may indicate specific areas of study to which the researcher should pay particular attention. The later fieldwork findings may then provide further revisions for the second survey wave. The third design alternates the two methods, one after the other. The first stage involves exploratory qualitative data collection that leads to the development of a quantitative data instrument such as a questionnaire. The results from the questionnaire can be studied in more detail in a further round of qualitative research. Finally, the fourth design also uses an alternating style. First a survey is taken that points the researcher to a particular phenomenon. The researcher then employs qualitative research to develop a strong close up conceptual understanding of how things work and a quantitative experiment is designed to test the resulting hypotheses.

Cavaye (1996) also supports a combined approach of research methods. She agrees with the first research design outlined above but suggests two further staged approaches. She argues that it is possible to collect both types of data, one after the other from the same site. Qualitative observations can help develop a theoretical structure that underlies a quantitative survey or alternatively, following quantitative methods, qualitative probing may be required especially when the quantitative analysis has thrown up unusual or unexpected findings (Sieber, 1973). The fourth

Figure 3-1 Illustrative Designs Linking Qualitative and Quantitative Data (Miles and Huberman, 1994: p41)



combination suggested by Cavaye is included in the third design proposed by Miles and Huberman. Qualitative methods could be used to collect data in the initial, exploratory stages of a project. Following this stage quantitative methods could be used to gather data on specified variables from a large number of respondents from different sites for subsequent testing (Gable, 1994).

3.4 SELECTION OF RESEARCH STRATEGY

Since this study aimed to provide empirical data from natural settings, the experimental (laboratory and field) and forecasting strategies must be put to one side. In addition, the desire to provide generalisable results within a specific time scale that clearly identified the elements of cause and effect, prohibited the use of action research or a phenomenological approach. The remaining strategies, if considered individually, had stronger positive attributes but also had significant limitations. For example, survey strategies gather empirical data that can be generalised to a wider population but provide little insight into the processes behind the phenomenon under study. In contrast, case studies can provide a deeper understanding of these processes but are limited in terms of the generalisability of findings to a wider population.

Consequently it was decided that the most effective research approach for this study was to combine these methods and thereby produce findings that enable a deeper understanding of the factors influencing CIS success but are also generalisable to

other Community Trusts. Furthermore, it was considered that a combined research approach would enable the findings from each stage of the project to inform and refine subsequent stages, thereby enhancing the reliability and validity of the study and ensuring that the focus of the study was maintained. The study adopted a three stage approach that follows Miles and Huberman's (1994) third mixed method design. Each stage of the project is reviewed below.

3.4.1 Stage 1: Exploratory Research

From the review of the literature it was clear that little academic IS research has been conducted in the community health context. The lack of existing research in the community healthcare sector meant that this study had few clearly defined parameters at the outset, other than to identify and understand the key factors influencing community information system success. It was possible to develop a preliminary research framework from the existing literature, however it was considered necessary to conduct exploratory research to explore the proposed framework design and check its suitability. More specifically, the exploratory research was designed to address four main aims:

1. To ensure that the study focused on the key best practice variables that were most important for CIS success.

2. To explore whether there were any additional variables that were considered important in the development of an information system in the healthcare sector that were not as evident in the existing literature.

3. To explore the main areas where organisational impact was occurring following the development and implementation of a CIS.

4. To explore and understand the aims and objectives set for a CIS and to develop an insight into the operation of both the system and its role within a Community Trust.

A single case study approach has been identified as being helpful in developing and

refining generalisable concepts and frames of reference (Lawler et al., 1985). Similarly, Yin (1994) argues that a single case study approach is appropriate for exploratory research and suggests that it can act as a useful prelude to further research. Furthermore, the single case study design allows the researcher to study the phenomenon in depth, getting close to the phenomenon, enabling a rich description and revealing its deep structure (Cavaye, 1996). Consequently, a single case study was considered an appropriate method to be adopted for the exploratory stage of the research as it could check the suitability of the proposed research framework while also developing a preliminary understanding of the issues surrounding the development, implementation and operation of a CIS.

The exploratory case study was conducted at Central Nottinghamshire Healthcare (NHS) Trust towards the end of 1996. Central Nottinghamshire Healthcare (NHS) Trust was chosen for the exploratory research because of an existing research link between Loughborough University and this Trust. This relationship meant that access to a wide range of interviewees and internal documentation was made available to the researcher that was unlikely to be as freely available at other Trusts where no prior contact and trust had been established.

At the time of the exploratory research, Central Nottinghamshire Healthcare (NHS) Trust was in the process of implementing a new CIS designed and supplied by Systems Team plc. A preliminary interview guide was developed from the existing literature and 13 semi-structured interviews were conducted with informants ranging from the Chief Executive to Clinical Managers. All these interviews were tape recorded and transcribed verbatim. Additional sources of evidence were also collected that included internal documentation, direct observations through shadowing clinical staff, informal conversations with senior managers and attending pilot evaluation interviews. These multiple sources of evidence ensured that the case study maintained high levels of construct validity (Yin, 1994) and also facilitated the triangulation of data sources to increase reliability. The findings of this stage of the research have been published in Coombs et al. (1998b).

3.4.2 Stage 2: Questionnaire Survey

Following the completion of the exploratory research the results were used to establish the overall research objectives and research framework for the study. However, it was acknowledged that the variables identified in the exploratory research were only based on evidence from a single case study and needed to be contextualised in respect to CIS development experiences in other Community Trusts in England and Wales. Consequently, a survey instrument was developed that was designed to confirm that the variables identified in the literature review and exploratory research were of equal relevance to other Community Trusts. More specifically, the survey had four aims:

1. To assess the level of adoption and importance associated with the key best practice variables identified in the literature review and exploratory research, in other Community Trusts;

2. To determine the extent of the organisational impact that has resulted from the development, implementation and use of a community information system in Community Trusts in England and Wales;

3. To derive a measure of the perceived success for each responding Trusts' community information system;

4. To determine the uptake and application of community information systems in Community Trusts in England and Wales.

Survey based research strategies have been recognised as having a number of positive attributes that are of particular value for this stage of the research. The results of survey research can be generalised to represent the population because they involve a large number of respondents, representative of the population (Galliers, 1992). In addition, if a mail survey approach is used, a large number of respondents can be reached economically; standardised and precise information can be collected and time can be saved in subsequent data analysis (Dillman, 1978; Wiersma, 1991; Bell, 1993). Consequently, a survey was considered the most appropriate research strategy for this

stage of the research.

A draft questionnaire was developed based on issues identified in the literature and issues identified during the exploratory research. The research instrument was extensively pre-tested by a selection of appropriate academics, staff at Central Nottinghamshire Healthcare (NHS) Trust, IM&T Managers from five other Community Trusts and members of the NHS Information Management Group. The pre-testing helped develop and refine the final draft of the questionnaire and, in the case of the IM&T Managers, served as an additional validity exercise to confirm that the most important variables were included in the survey design

The questionnaire was targeted at the IM&T managers in all Community, Mental Health and Learning Disability NHS Trusts in England and Wales. It was envisaged that this selection strategy would ensure that all Community Trusts were incorporated in the sampling frame. A database was created from the 1995/96 and 1997/98 NHS Yearbooks (NHS, 1995; NHS, 1997) whilst additional information was provided by the NHS Management Executive. All the questionnaires were sent to named addressees and in cases where no IM&T manager was identified, the Chief Executive was used as an alternative. The database had 236 potential respondents that was considered to be the total population of Community, Mental Health and Learning Disability Trusts in England and Wales.

The final draft of the questionnaire was piloted on a 10% sample of the main survey population. Twenty questionnaires were sent out and 12 were returned giving a very encouraging response rate of 60%. Analysis of the responses indicated no problems with the content or structure of the questionnaire and no alterations were made. Further details of the research instrument design and application, the analysis of the data and subsequent findings are presented in chapter five and the findings have also been published in Coombs et al. (1998a) and Coombs et al. (1999).

3.4.3 Stage 3: Multiple Case Studies

The findings from the previous survey stage of the research confirmed that the majority of the variables identified in the literature and highlighted from the

exploratory research were considered important to CIS success by responding IM&T Managers. In addition, the findings also suggested a number of possible relationships between variables although no causality could be inferred from the statistics. A recent review of the literature has shown that there is a considerable range of research studying IS success that can be classified into a variety of different methodological and research designs (Doherty et al., 1998). However, this existing research has tended to focus on developing a critical set of factors affecting IT implementation success and less emphasis has been given to 'how' and 'why' these factors interact together to produce either success or failure. Consequently, it was considered necessary to conduct additional research to attempt to gain a greater understanding and insight into the relationships between best practice, organisational impact and CIS success. More specifically, the third stage of the research had four main aims:

1. To explore the relationship between the ability of CIS project teams to adopt best practice and the resultant levels of success or failure of the operational information system;

2. To explore the relationship between the organisational impact engendered by the system and the resultant levels of success or failure of the operational information system;

3. To explore how the organisational impacts resulting from the development and implementation of a CIS can be assessed and effectively managed to ensure that they are positive.

4. To explore the relationship between the occurrence of positive user attitudes and user ownership and the resultant levels of success or failure of the operational information system.

Case study research has been advocated as one of the most effective methods to explore complex relationships and develop increased understanding of the process of IS development (Gable, 1994; Pare and Elam, 1997). Advocates of qualitative research have argued that case study research has a number of considerable strengths

for the IS domain. Benbaset et al. (1987) identify three advantages of case study research: these being that the researcher can learn more about the system in its natural environment, generating theory from actual practice; the researcher is in a better, closer position to understand the complex nature of the processes taking place; and that new developments in the IS field can be studied as they occur. Consequently, it has been argued that *'case study research is particularly appropriate for the study of information systems development, implementation and use within organisations'* (Darke et al., 1998).

In contrast to single case designs, multiple case studies allow the study of phenomenon in more diverse settings, and facilitate cross case analysis and comparison. Furthermore, this multiple approach allows the researcher to confirm that findings are not being unduly influenced by confounding variables unique to individual research settings (Cavaye, 1996). Multiple cases may also be used either to predict similar results (literal replication) or contrasting results for predictable reasons (theoretical replication) (Yin, 1994: p46). The survey responses meant that is was possible to target a group of potential case study Trusts that were all using the same CIS package but were experiencing varying degrees of system success. Consequently, a multiple case approach was considered the most effective way of comparing different Trusts' experiences and attempting to explain their contrasting results in terms of CIS performance. It was envisaged that this approach would enable the researcher to explain and interpret the complex relationships between best practice, organisational impact and success.

Past literature on best practice and organisational impact as well as the evidence from the initial case study research and the questionnaire survey were used to develop questions to be included in a semi-structured interview schedule. On the basis of their self-reported CIS performance a range of five Trusts were contacted and in each case the initial contact was through the respondent to the questionnaire, either the IM&T Manager or the Information Manager. An interview was conducted with each of these key informants at the end of which requests were made for additional members of the Trust to interview. It was considered particularly important that staff from areas outside the Information and IT Departments of the Trust be interviewed to record

their perspective on the use of a CIS. The clinicians form the largest stakeholder group that use a CIS and one of the key measurements of the success of a CIS is the clinicians' satisfaction with the system. A criticism frequently levelled at quantitative IS research is that it tends to concentrate on documenting and studying the views of IS professionals who have a clear vested interest in the success of the system. Consequently the opportunity to interview and document other staff views towards the system was considered to be of great importance.

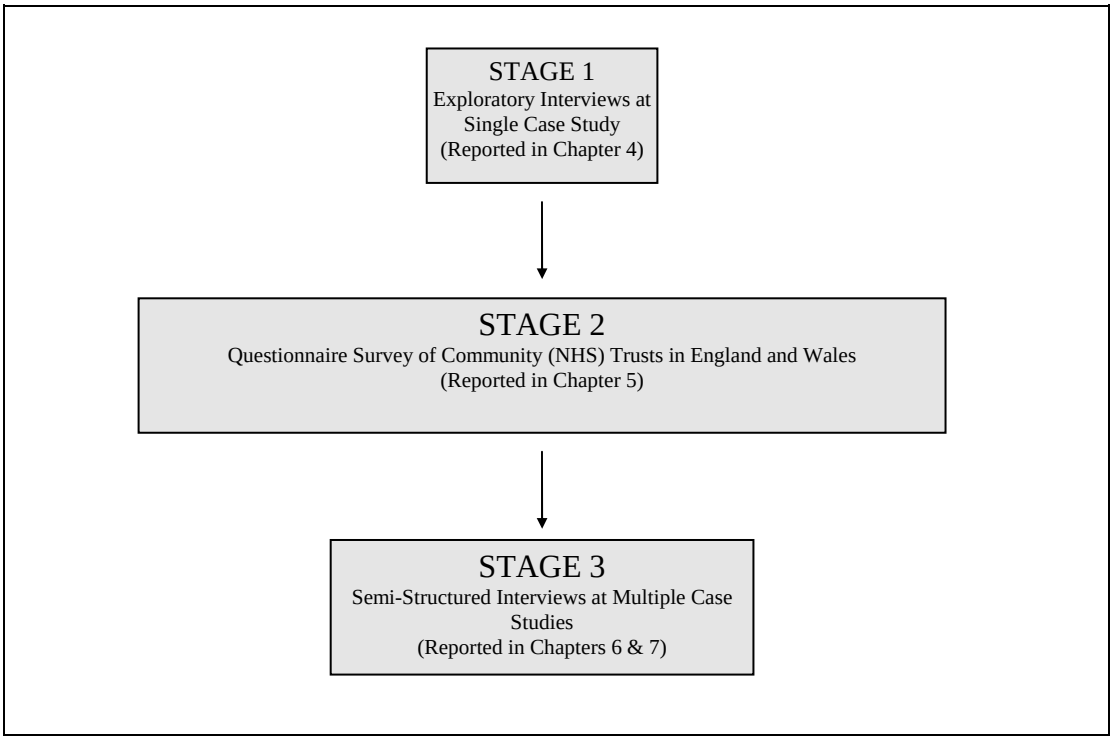
The key informants were asked to identify an administrator, a clinical manager and a clinical user who would be willing to participate in the study. In total, 19 informants were interviewed across the five Trusts with the maximum number of informants per Trust being five and the minimum, two. In addition to participating in the interviews, the IM&T manager was asked to provide, if possible, documentary evidence, such as published articles, internal reports or newsletters, to help contextualise and verify the interview responses. Each interview was conducted, in-situ, at the Trust and lasted approximately an hour. To ensure the validity of the interview process, the informants were asked to supply specific evidence and examples to support their assertions. In some cases, the face to face interview was complemented by a follow-up phone call that was used to clarify issues and attain supplementary information. Both the initial interviews and the follow-up phone calls were tape recorded and later transcribed verbatim.

It should be emphasised that although the multi-stage research design discussed above was devised at the outset of the research, each stage was comprehensively reviewed in the light of previous findings from earlier stages. This reviewing process meant that the overall research design remained flexible throughout the project in order to maintain its focus and maximise the benefits on both a practical and academic basis. This approach was adopted because of the lack of prior research in this sector and a desire to provide practical recommendations that would be generalisable across the community health sector and, to a lesser extent, other sectors of the NHS and the wider IS community. Furthermore, it allowed the researcher to develop a wider understanding of the key factors influencing the ultimate level of success associated with a CIS and increased the robustness of the results because the findings can be

strengthened through triangulation - the cross validation achieved when different kinds and sources of data converge and are found congruent (Jick, 1983; Bonoma, 1985; Benbasat et al., 1987; Yin, 1994).

It should also be noted that the stages should not be considered as having equal weighting. The key results and discussion are largely based on the third (multiple case studies) stage of the research and this is reflected in both chapters six and seven being devoted to reporting these results. However, the final discussion, overall conclusions and recommendations are drawn from the findings of all stages of the research project, thereby maximising both the depth of understanding and generalisability of the study's findings. A summary of the overall research design is presented in Figure 3.2. The following section provides a discussion of the philosophical stance that was taken for the research project.

Figure 3-2 Overall Research Design



3.5 PHILOSOPHICAL PERSPECTIVE OF RESEARCH

In reviewing the literature regarding the philosophical perspectives that have been taken on IS research it would appear that two traditions have emerged based on

different epistemologies: positivism and interpretivism. Cavaye (1996) notes that positivism and interpretism rely on quite different assumptions about the nature of knowledge. Consequently, she argues that the two traditions demand different approaches to research, but adds that due to its versatility, case study research can be used in both. Case study research can either be employed in a positivist study measuring pre-defined variables, according to pre-defined hypotheses using pre-defined research instruments. Alternatively, case study research can be used in an interpretative manner, trying to understand the nature of a phenomenon and trying to elicit meaning from seemingly irrational behaviour in a social setting.

The positivist perspective is founded on an ontology in which an objective physical and social world exists independently of humans' knowledge of it. There are pre-existing regularities that can be discovered, investigated and characterised relatively unproblematically using constructs devised by the researcher (Orlikowski and Baroudi, 1991). Positivist research is concerned with the empirical testability of theories in order to discover the general principles or laws which govern the natural and social world (Orlikowski and Baroudi, 1991). It is also assumed that the investigation is value free, so the researcher remains detached, neutral and objective (Darke et al., 1998). Positivism emphasises rigour in research (Keen, 1991) by focusing on theoretical grounding, on evidence and on the persuasiveness of logical argument (Cavaye, 1996).

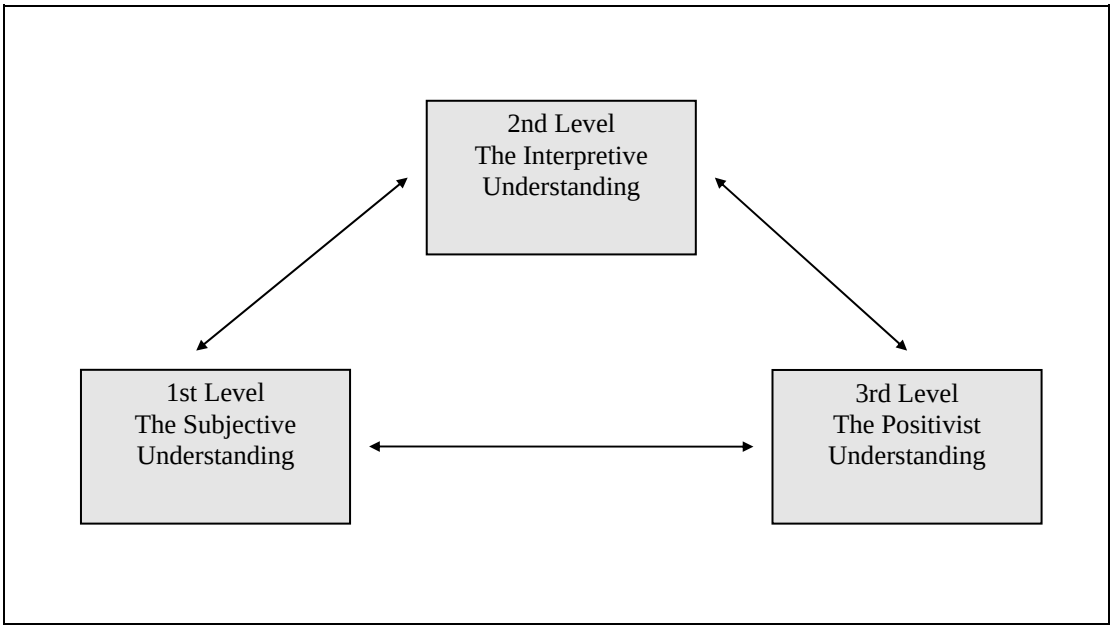
The interpretive approach aims to understand phenomena from the point of view of participants directly involved with the phenomena under investigation (Orlikowski and Baroudi, 1991). This approach is based on an ontology in which reality is subjective, a social product constructed and interpreted by humans as social actors according to their beliefs and value systems (Darke et al., 1998). Interpretative research does not enter a social setting with *a priori* constructs, but allows constructs to emerge whilst the researcher is in the field learning about and trying to understand the phenomena (Cavaye, 1996). It rejects the notion of value-free research and is not concerned with the repeatability of an explanation. It is argued that the interpretivist researcher attempts to develop a deep understanding of the phenomena being studied and acknowledges their own subjectivity as part of the process (Darke et al., 1998).

The value of interpretive research is based on the quality of the explanation provided and whether it facilitates the understanding of the phenomena by others. Lee (1989) argues that the researcher must show evidence of grasping and explaining the rationale behind actions and processes, however irrational they might initially appear.

Although the two approaches outlined above have been traditionally considered as opposed with irreconcilable differences, Lee (1991) has suggested that it is possible to combine the perspectives and provide different views of the same phenomena. He proposes that this integration of perspectives is possible by adopting a three level framework, each level concerned with a different understanding of social reality. The first level of understanding refers to the subjective understanding of reality as it appears to the human actors in their natural environment. The second level understanding refers to the understanding of the researcher who enters the field trying to interpret what is happening. This second level concerns the interpretation of the original first level understanding and can be viewed as the interpretive element of the framework. The third level of understanding refers to the researcher's conceptualisation and abstraction of second level understanding. This third level can be viewed as the positivist element of Lee's framework. The three levels constitute increasing degrees of abstraction from social reality but should converge and correspond providing additional opportunities to test the validity of each level of understanding (Cavaye, 1996). The cyclical nature of the three levels is shown in Figure 3.3.

Three research methods have tended historically to dominate IS research: survey, laboratory and case studies (Orlikowski and Baroudi, 1991). Of these three approaches, survey research is typically quantitative by design and case studies tend to be associated with qualitative research techniques (Gable, 1994). Lee (1991) suggests that qualitative research takes an ostensibly interpretivist philosophical perspective and quantitative research is ostensibly positivist in nature. Consequently, if these two research approaches are combined then both philosophical perspectives may be incorporated into a single study. This combining of philosophical perspectives has occurred during this research project.

Figure 3-3 Lee's (1991) Model for Integrating Positive and Interpretive Approaches



As has been stated in previous sections, this study has combined survey and case study research methods in a three stage approach. Consequently, the study has adopted techniques that are predominantly found in either the positivist or interpretivist schools. It is interesting to note that while Lee (1991) advocates a combining of research perspectives he also argues that a study does not need to pursue both approaches with equal emphasis. Consequently, throughout the different stages of research this study has been more inclined towards a positivist view of the research environment.

During both the case studies (single and multiple) and the survey the researcher has set out with the belief that there are pre-existing regularities that can be discovered and investigated using constructs that the researcher has devised. This belief has been reflected in the case study interview schedules and survey design adopted in each stage of the project that have all shown a considerable degree of structure and focused on specific constructs to be explored. However, although this approach was necessary for the survey, it was not followed blindly during the case study interviews. The researcher remained sensitive to additional interpretations and issues that were raised during the interview process and these new issues, where appropriate, have been

analysed and discussed in the study's findings. In this respect, the study also follows the interpretivist school of thought and attempts to understand phenomena through accessing the meaning participants assign to them. Consequently, both philosophical perspectives have been adopted that have enhanced the validity of the study's overall findings.

3.6 RESEARCH METHODS

The research design adopted two data collection methods: semi-structured interviews within the single and multiple case studies; and a postal questionnaire survey. Both of these research methods are reviewed below as are the issues of reliability and validity in the context of the research design.

3.6.1 Case Study Interviews

The normal way of differentiating types of interview is by the degree of structure imposed on the format and by using this perspective three main varieties can be identified. The first type of research interview uses a standardised or structured approach and is characterised by the wording of questions and the order in which they are asked which is the same from one interview to another (Fielding, 1993). Commonly, respondents are expected to choose an answer from a series of alternatives given by the researcher and this technique is often used in market research. It provides information that is easily quantified, ensures comparability of questions across respondents and makes certain that the main topics are covered. However, it gives little opportunity for new insights. Respondents are not free to give the answers or information that they think is important and a relevant area may be missed because questions were not asked about it (Breakwell, 1990)

The next type of interview is the semi-structured; in this case the interviewer asks certain major questions the same way each time, but is free to alter their sequence and probe for more information. The interviewer is therefore able to exert some flexibility over the interview style tailoring it to the level of comprehension and articulacy of the respondent. It also allows the interviewer to respond to the possibility of informants, in responding to a question, providing answers to questions that were going to be asked at a later point (Fielding, 1993).

The third type of interview involves an unstructured technique. In this case interviewers simply have a list of topics that they want the respondent to talk about, but are free to phrase the questions as they wish, ask them in any order that seems sensible and even join in the conversation by discussing what they think of the topic themselves (Fielding, 1993). Consequently, in this approach comparability is sacrificed for personally-relevant information (Breakwell, 1990).

Paradoxically, the benefits of the research interview are also its potential problems. The interviewing method relies heavily on the opinions, perspectives and recollections of respondents. Such perspectives and recollections are vulnerable to distortion and inaccuracy and it has been noted by Argyris (1985) that interviewees tend to articulate their espoused behavioural theories (i.e. the behaviour they would like to produce), as opposed to their theories-in-use (i.e. the issues that determine actual behaviour). Furthermore the construct validity of interview data is vulnerable also to a number of more specific threats. These threats can include: 'demand effects', that is, the interviewee acting in a way they believe the researcher requires in order to please and/or help the researcher; 'evaluation apprehension' on the part of the interviewees, that may lead them to provide answers showing them in a more favourable light; and 'researcher expectancy effect' whereby the evidence gathered is influenced by the expectations of the researcher (Fielding, 1993).

In order to reduce these potential problems Argyris (1985) suggests that the researcher should encourage respondents to illustrate their statements and to get them to make explicit and reflect on their theories governing their inferences about other people's behaviour, as well as their own. Marginson (1996) also proposes five main tactics that can be used to address some of the problems encountered in research interviews:

1. Making it clear to respondents that the researcher does not have a specific theory to prove or disprove, and thus interviewees are not meant to provide the 'right answer'.

2. Asking respondents to illustrate the behaviour or issues they are describing (‘that’s interesting, could you provide an example?’).

3. Asking the respondent to explain how they know what they are saying to be ‘true’.

4. Inquiring into comments that appear to the researcher to be puzzling or inconsistent with prior remarks, in a way that seeks to communicate the absence of a value judgement on behalf of the researcher.

5. The researcher can re-phrase the respondent’s answer to test whether his or her understanding is as accurate as possible. For example, ‘Let me re-phrase the way I understand this and please tell me whether that is a fair representation of what you are saying.’

These approaches are thought to be effective in reducing the demand effects and evaluation apprehension because they emphasise that the researcher is really interested in learning about something and not (dis)proving a specific theory or point of view. Furthermore, the quest for illustrations increases the likelihood that the researcher will detect behaviour that is meant to portray the respondent in a better light (Marginson, 1996). However, these methods are not without their drawbacks. Interviews tend to last longer when respondents are probed for illustrations or explanations, they require an intense degree of concentration on behalf of the interviewer in order to identify gaps in respondents answers and the interviewer is required to continuously adapt to respondents answers possibly to the detriment of other areas of interest.

The research design employs research interviews as the main data collection exercise in the exploratory case study (stage 1) and the later multiple case studies (stage 3). In both cases the desire to study specific issues while retaining the opportunity for additional issues to be identified was considered particularly important. Consequently, semi-structured interviews were used for both stages as these allow the broad focus of the investigation to be maintained but also provide the opportunity for

the capture of wider issues that may help the researcher form a fuller understanding of the phenomena under investigation. They also allow the interview to be guided by the perceptions and interests of the respondent while maintaining a level of comparability between respondents. In both stages the suggestions made by Marginson (1996) were adopted when possible and further details of the precise interviewing techniques are provided in chapters four and six.

3.6.2 Questionnaire Surveys

Questionnaires are most commonly administered via postal services although they can be distributed by hand or presented on the internet for respondents to access at their own convenience. Questionnaires follow a standardised format in which most questions are pre-coded to provide a list of responses for selection by the respondent and are consequently, positivist in nature. The questions require careful phrasing so that they are immediately comprehensible because respondents will not be able to obtain immediate help with anything they do not understand (Newell, 1993).

The main advantage of self-completion questionnaires is that a large population can be surveyed, relatively cheaply (Dane, 1988). Costs are reduced because interviewers are not required and pre-coding and computerisation can speed up analysis. Respondents are also free to complete questionnaires at a time convenient to them. However, postal questionnaires do have a number of disadvantages. Generally the response rate is low and even when questionnaires are completed, respondents answers may be incomplete, illegible or incomprehensible (Newell, 1993). Huber and Power (1985) also highlight the possibility of respondents providing inaccurate data when completing questionnaires and they identify four reasons for this inaccuracy:

1. Respondents may be reluctant to disclose information potentially adverse to the respondent’s career and/or a desire to project an image of conformance to accepted norms;

2. Respondents may be biased because of the inherent limitations of all individuals in terms of cognitive processing. Limitations in recall and a tendency to anchor phenomena to recent events are symptoms of this potential

bias;

3. The respondent may lack information or knowledge concerning an area of inquiry and consequently, second-hand information and imagination may fill in the information gaps and lead to inaccurate responses;

4. Inappropriate data elicitation procedures can create situations where the meaning attached to a question by the respondent is different from that intended by the researcher. Clearly, any of these confounds and inhibits valid inferences from gathered data.

Although it is impossible to completely eliminate such biases general coping strategies and specific tactics can be utilised to reduce their effects. Huber and Power (1985) propose several guidelines for improving the accuracy of reports gathered from respondents and these guidelines are presented in Table 3.1. As has been indicated a postal questionnaire survey sent to IM&T Managers in all Community Trusts in England and Wales was employed in the second stage of the research project. Table 3.1 relates the coping strategies identified by Huber and Power (1985) with the aforementioned sources of data inaccuracy and also outlines the tactics utilised in the stage 2 questionnaire survey to improve respondent accuracy.

Table 3:1 Sources of Data Inaccuracy and Coping Strategies

Sources of Data Inaccuracy	Coping Strategy	Tactic Utilised in Stage 2 Questionnaire Survey
• Respondent not motivated to answer or answer correctly	• Attempts to motivate the respondents to co-operate with the researcher	• Confidentiality assured • Summary of research results offered
• Imperfect recall	• Seek factual data from respondents with higher emotional involvement	• IM&T managers surveyed
• Respondents lack of information or knowledge	• Identify person most knowledgeable about issue of interest	• Exploratory research used to identify respondents strongly involved with phenomena
• Inappropriate data elicitation procedures	• Use questions that are pre-tested, structured and that impart an image of being rich in information content without being complex.	• Pre-tested and piloted questionnaire

A more detailed discussion of the questionnaire design and tactics used to ensure

accuracy and integrity of the survey results are presented in chapter five.

3.7 SUMMARY

This chapter has identified the research strategy choices that were faced at the outset of the investigation of the factors influencing the successful development, implementation and operation of a community information system in the NHS. It has highlighted the rationale for the selection of a combined approach that utilises case study and survey strategies and has provided details of how the research design was implemented. The key strengths of this approach have been recognised by Gable (1994) who suggests that combining case studies with survey research in a larger, more complex research design can be useful:

1. As a source of rich detail to aid the interpretation of quantitative findings from the survey (e.g. construct validity/internal validity and interpretation of observed associations);

2. As a further means of triangulation, by testing the propositions or patterns with the case sample as well as with the quantitative survey data (i.e. as a repeated experiment);

3. To develop a close relationship with a few organisations who may serve as the sample for pilot testing the survey instruments and as a cross check against questionnaire responses to aid in validating the survey instruments.

In addition, the research methods for the investigation (semi-structured interviews and a postal questionnaire survey) have been discussed, outlining the choices that have been made and noting the problems that have been overcome. Further details of these methods are provided in the next three chapters.

Chapter 4: Developing Terms of Reference for Research

4.1 INTRODUCTION

This chapter details the first stage of the research project which sought to develop and refine the terms of reference for the research through conducting a single exploratory case study. The chapter begins by outlining the objectives that were set for this stage of the research and then provides details of the methodology adopted in selecting the case study and developing and executing the research instrument. The method of data analysis is then discussed and subsequently the results reported. The results are presented in five main sections that are concerned with the background to the case study, the aims that were set for the CIS, the adoption of best practice, the organisational impact engendered by the system and the technical aspects of the system. A summary of the main features that have emerged from the case study results are then discussed and the chapter concludes by providing a revised research framework and research objectives for the remaining two stages of the study.

4.2 SUMMARY OF OBJECTIVES FOR CASE STUDY

The study of the literature in chapter two identified two overall research objectives for the research project. These research objectives are:

1. To explore the relationship between the ability of a CIS project team to adopt best practice, and the resultant level of success or failure of the operational information system.

2. To explore the relationship between the level of organisational impact engendered by the system, and the resultant level of success and failure of the operational information system.

However, in attempting to operationalise these research objectives a number of practical issues were identified that required attention before the main research was conducted. The first of these issues was immediately evident when studying the literature. As has been shown in chapter two, the existing literature has given considerable attention to identifying those variables that comprise 'best practice' in terms of information system implementation. These variables have been developed from a range of research projects in varying sectors, organisations and using varying information systems. The results of this research have provided a vast range of possible best practice variables too great to be addressed in entirety for this research project. Consequently, it was considered necessary to reduce the range of possible best practice variables to a more manageable size, while ensuring that only those best practice variables most important to the successful implementation of a CIS were studied.

Closely linked to the need to reduce the number of best practice variables was a desire to explore whether there were any additional variables that were specific to IS development in the healthcare sector, but that were not necessarily prominent in the existing IS literature. As has been noted, the variety of different research environments used to develop the full range of best practice variables may result in the inclusion of some variables that may be significant in some sectors but not in the healthcare sector. It was therefore desirable to conduct some exploratory research to assess whether any additional variables should be included in the later research that were more healthcare specific.

Finally, it was also clear from the literature review that there is a limited amount of

literature that had studied the organisational impact of implementing an information system within a healthcare organisation. Specifically, there was almost no literature that studied the organisational impact of introducing an information system into a Community Trust. Although the range of possible organisational impact variables that could be included in the study was markedly smaller than in the case of the best practice variables it was thought necessary to conduct some preliminary research to explore the key areas where organisational impact was occurring within a Community Trust and thereby check the suitability of the overall research framework.

The practical issues outlined above presented a strong argument for conducting some exploratory research in order to further develop and refine the terms of reference for the research project. The decision was taken to conduct exploratory research and a series of objectives were developed, each of which is briefly outlined below:

1. To explore the proposed framework design and check its suitability. This objective is a product of the issues identified above in needing to reduce the number of best practice variables to be addressed in the later research and to explore the key areas where organisational impact is occurring in a Community Trust.

2. To explore whether there are any additional variables that exist that are significant to the successful development, implementation and use of a CIS in a Community Trust. This objective was also a product of the above issues and was intended to ascertain whether there were any significant issues that were particularly important in a healthcare environment that had not been evident in the literature.

3. To explore and understand the aims and objectives set for the implementation of a CIS and develop an insight into the operation of both the system and its role within a Community Trust. It was envisaged that this objective would enable the researcher to develop greater contextual understanding of why a Trust should need to implement CIS, what the system was intended to achieve and the practical issues that were involved in the process of developing and

implementing a CIS.

It was envisaged that by addressing these three objectives a more tailored and refined framework could be produced for the remaining research. The method adopted for the exploratory research is reviewed in the following section.

4.3 METHODOLOGY

In order to address the objectives for the exploratory research it was decided to use a single case study and conduct a series of interviews with a wide range of staff involved with the system. A full discussion of the reasoning behind the choice of a single case study approach for the exploratory research is provided in chapter three and this section is predominately concerned with the design and execution of the research instrument.

The single case study method does inevitably have some drawbacks, principally in terms of the transferability of the results to other organisations. To remedy the lack of transferability the second stage of the research, presented in chapter five, will be designed to confirm that the issues identified in the terms of reference are of equal importance to other Trusts developing and implementing a community information system. However, concentrating on one organisation does allow the issues associated with the system to be studied in more depth and enable the creation of a rich description of the case study (Cavaye, 1996). Consequently, a single case study was considered adequate for the exploratory stage of the research project.

4.3.1 Choice of Case Study

The site that was chosen for the exploratory case study was Central Nottinghamshire Healthcare (NHS) Trust who were also sponsoring the research project. Central Nottinghamshire Healthcare (NHS) Trust had purchased a Community Information System in 1995 from one of the main suppliers of these community modules (Systems Team plc) and were piloting the system at the start of the research project. Central Nottinghamshire Healthcare (NHS) Trust was chosen above other possible NHS Trusts for the exploratory research because it had a number of significant practical advantages.

Firstly, there was an existing research link between Loughborough University Business School and Central Nottinghamshire Healthcare (NHS) Trust that enabled the researcher to be assured of access to all desired informants at various organisational levels throughout the Trust. Clearly, this access provided a considerable advantage in conducting the preliminary research at Central Nottinghamshire Healthcare (NHS) Trust rather than at other Trusts as a rapport already existed between the organisations.

Secondly, the nature of the exploratory research required in-depth interviews with staff in order to explore the full range of variables as outlined in the next section. It was considered unlikely that an organisation, other than the sponsors, would be willing to allow staff sufficient time away from their day to day work activities for the interviews to be fully conducted.

Finally, it was considered desirable to conduct interviews with a wide range of staff from different tiers in the organisation in order to gain a greater understanding of the key issues within a Community Trust from a variety of different perspectives. This approach would also have the advantage of allowing the researcher to triangulate the results from the interviews and thereby ensure greater validity. Central Nottinghamshire Healthcare (NHS) Trust presented the most useful organisation in which to conduct this approach as there was strong support for the research in the Trust and staff at all levels of management were expected to be willing to participate. The researcher was also provided the opportunity to attend several pilot evaluation interviews, as an observer, conducted at Central Nottinghamshire Healthcare (NHS) Trust with clinical users of the system. These evaluation interviews presented an ideal opportunity to assess the views of a large number of clinical staff concerning their experiences of using the CIS.

At the time of conducting the research interviews, Central Nottinghamshire Healthcare (NHS) Trust had just completed the pilot of their CIS and were beginning to implement the system across the whole Trust. Approximately 50 staff were using the system of which about two thirds were clinical staff and had been using the

system for a year. It was expected that the total number of clinical users would ultimately be over 300 staff.

4.3.2 Design of Interview Schedule

The interview schedule was designed from existing literature on best practice and organisational impact with particular attention given to variables identified in past literature conducted in a healthcare context. A full copy of the interview schedule is provided in **Appendix 1**. A semi-structured interview approach was chosen rather than a structured approach because of the exploratory nature of the research. The interview schedule had five sections, each of which is briefly reviewed below:

Section 1: Introductory

The schedule began with some preliminary questions about the informant, what their role was within the Trust and how they had been involved with the CIS development project, if at all. The overall aims of the CIS were discussed as were the improvements the informant was personally hoping to achieve from using the system. Finally informants were asked what they thought people's impressions had been of the CIS so far and what significant problems had been encountered during the project so far.

Section 2: Best Practice

The second section of the interview schedule involved a discussion about the implementation of the CIS and the issues that were considered to be most important by informants to system success. Informants were asked to identify which areas of best practice they considered to be most important to successfully implementing a CIS and to explain their reasoning. In addition, informants were asked about the problems that they had encountered while attempting to adopt best practice and how they had been resolved. Considerable efforts were made to avoid 'leading questions' when talking to informants as it was considered particularly important that the informants were not influenced by the researcher when identifying what they considered to be the most important elements of best practice.

Section 3: Organisational Impact

The third section of the interview involved a discussion with informants about the actual and envisaged organisational impacts engendered by the CIS. Informants were asked to identify the areas where organisational impact had occurred and how the impact had been manifested. Informants were also asked to identify where future organisational impacts were likely and what form they would take. With regard to both actual and envisaged organisational impacts, it was also discussed with informants whether they considered these impacts to have an influence on the success of the system. When relationships between organisational impact and success were identified, informants were encouraged to explain their reasoning and provide examples of these relationships. During this part of the interview, greater use was made of prompts to ensure that each area of organisational impact identified in the literature review was discussed by informants. However, the onus was still placed on the informant to identify those impact variables that were most important to system success.

Section 4: Technical Aspects of the CIS

The penultimate section of the interview discussed some of the technical aspects of the CIS with informants to assess whether technical considerations were influencing how successful the CIS was perceived to be. The results from questions in this section were envisaged to provide a basis to confirm that technical issues, as indicated in the literature, were not the principal factors behind the overall success of a CIS. Consequently, the discussion addressed topics such as the ease of use of the palmtop and desktop computers, the importance of technical issues to the overall perceived success of the CIS and the level of understanding of the functionality and capabilities of the system by staff within the Trust.

Section 5: Non-Directed Discussion

The final section of the interview schedule allowed informants the freedom to revisit or raise any other issues that they felt were particularly important to the success of a CIS that had not been adequately covered during the interview.

A final draft of the interview guide was pretested with several academics and the

Organisational Development Advisor at Central Nottinghamshire Healthcare (NHS) Trust. The pretesting confirmed the suitability of the design of the research instrument for collecting the exploratory data. In addition, the design and content of the interview guide was also discussed with two Trust Directors at Central Nottinghamshire Healthcare (NHS) Trust, to confirm that it would be acceptable for use within the Trust.

4.3.3 Targeting of Interviewees

As has been indicated in Section 4.3.1 one of the advantages of conducting the exploratory research at Central Nottinghamshire Healthcare (NHS) Trust meant that a large range of informants at different levels within the Trust could be interviewed. Consequently, the interviewees ranged from the Chief Executive to Community Service Managers and full details of all informants interviewed is presented in Table 4.1. The interview schedule was designed so that interviews lasted for about one hour in order to generate a reasonably detailed impression of the issues encountered with the system, although several interviews lasted longer.

Table 4:1 Interviews Conducted at Central Nottinghamshire Healthcare (NHS)Trust

Interviewee Number	Title	Length of Interview
	Senior and General Managers	
1	Chief Executive	1 hr
2	Director of Finance and Information	50 mins
3	Director of Corporate Affairs	1 hr
4	General Manager	1 hr 10 mins
	IT Related Staff	
5	IM&T Manager	1 hr
6	CIS Project Manager	1 hr 30 mins
7	Organisational Development Advisor	1 hr
8	Information Manager	1 hr 20 mins
9	IT Trainer	1 hr 20 mins
	Clinical Managers	
10	Senior Nursing Manager	1 hr 30 mins
11	Rehabilitation Manager	1 hr
12	Community Service Manager	1 hr 10 mins
13	Community Service Manager	40 mins

4.3.4 Execution of Interviews

Each interview was conducted in-situ at the Trust and prior to the start of each session

the researcher explained the aims of the interview: that it was intended to gain an understanding of the respondents perceptions and experiences of using the CIS and to identify any additional issues that should be addressed in the main research. It was also indicated to the informant which other staff were going to be interviewed and that the intention of the research exercise was to gather views reflecting different perspectives on the CIS. This emphasis was made to reassure informants that the research would record an accurate and balanced impression of the development, implementation and operation of the CIS and not be polarised towards particular individuals' views.

An effort was also made to indicate to informants that although the interview had a clear structure in terms of its content, with questions about specific aspects of the information system or its impact, that it was for the informants to indicate whether they felt that these issues were relevant to a CIS project (Marginson, 1996). Equally, informants were encouraged to volunteer additional information should they feel it was relevant to the overall aims of the interview. Finally, it was emphasised to informants that the interviews would be completely confidential and no quotes would be directly attributable. It was also explained that a report would be produced from the interviews and made available to all staff that participated, as well as to Trust management. All the informants agreed to have the interview tape-recorded and the tapes were duly transcribed. To ensure the validity of responses informants were encouraged to provide specific examples to support their statements.

To supplement the research interviews additional evidence was collected from a variety of different sources. Three clinical staff were shadowed for a day by the researcher, to develop an empirical understanding of the issues that clinical staff encountered while conducting their daily work. This process also gave the researcher a useful insight into the working practices of Health Visitors and District Nurses and informal conversations helped the researcher gauge the attitudes of clinical staff towards IT and the community information system.

A considerable amount of documentary information was also made available to the researcher that included: strategic direction documents; annual reports and accounts;

internal reports concerning the CIS; the summary of need for the CIS; the business case for the CIS; promotional material from the different suppliers considered for the CIS; CIS newsletters and more general Central Nottinghamshire Healthcare (NHS) Trust newsletters. In addition, the researcher was also invited to attend and observe six CIS pilot evaluation interviews conducted by the Organisational Development Advisor with clinical users of the CIS. A full copy of the evaluation report was also made available to the researcher.

The evaluation interviews lasted for about 30 minutes and involved the Organisational Development Advisor and several clinical staff from different localities within the Trust. The interviews were semi-structured in design with three principal themes driving the discussion: what things the clinical staff liked about the CIS; what things clinical staff disliked about the system; and whether clinical staff could suggest any ways in which the system could be adapted to help them in their clinical work. The comments made by the clinical staff were recorded by comprehensive note-taking by the Development Advisor during the interviews. The researcher attended six of the eight evaluation interviews that were conducted and was also provided with a full copy of the pilot evaluation document produced by the Organisational Development Advisor (Project Assurance Team, 1997). The evaluation document also provided full details of clinical staff comments, collected at the time of the interviews regarding their experience of using the CIS which supplemented the researcher's own notes made at the time. As a result of this involvement, it was considered that the researcher was able to develop a sound understanding of the issues and experiences that clinical staff had experienced in using the CIS.

Finally, as part of the research link between Central Nottinghamshire Healthcare (NHS) Trust and Loughborough University Business School, the researcher spent at least one day a week based at the headquarters of the Trust. While at the Trust, the researcher shared an office with the Organisational Development Advisor and consequently, was able to share many informal conversations with the Development Advisor and other staff about the CIS, its implementation and the impact the system was having on staff. This additional information gathered from multiple sources of

evidence, coupled with the data collected from the research interviews, enabled the researcher to develop an in-depth understanding of the issues and problems surrounding the CIS at Central Nottinghamshire Healthcare (NHS) Trust.

Furthermore, these additional data sources, meant that the data analysis could be performed using multiple sources of evidence. This approach allows the process of triangulation and the development of converging lines of enquiry that ensure that the findings of the exploratory research have high levels of construct validity and reliability (Yin, 1994: p91).

4.4 DATA ANALYSIS

The analysis follows the three concurrent activities identified by Miles and Huberman, (1994, p10) of data reduction, data display and conclusion drawing/verification. This approach is necessary to ensure that the researcher does not become overloaded from unreduced data transcripts and their information processing abilities impaired (Faust 1982). Data reduction was conducted on each interview transcript using mainly '*in-vivo'* codes, that is codes derived from phrases used repeatedly by informants (Strauss and Corbin, 1990). *'In-vivo'* codes (as opposed to codes determined prior to the analysis) are appropriate when the research is essentially exploratory and are more useful in identifying new variables than adopting constrained literature-based codes (Diamantopoulos and Souchon, 1996). Marginal remarks made by the researcher were also used during the coding period to add clarity and meaning to the transcripts as well as having the ability to help revise and improve the coding structure (Chesler, 1987).

From the codes it was possible to develop a series of within case matrix displays for the Trust. The within case analysis was primarily conducted using several role ordered, variable clustered matrices. These displays had the advantages of showing all the relevant responses of all key informants on one sheet and allowing a comparison between responses and informants (Miles and Huberman, 1994 p128). Five matrix displays were created from the interview transcripts that presented informants' views on the aims of the system, the adoption of best practice, the organisational impact engendered by the system, technical aspects of the system and additional comments

from the unstructured aspect of the interview. Data were entered using either labels, quotations, ratings or short summary phrases. Three of the matrices (those concerning best practice, organisational impact and technical aspects of the system) were further segmented by informants responses about specific variables. For example, informants' comments about issues that could be classified as either senior management commitment, user involvement or training and support were studied individually, but clustered under the concept of best practice. An example of the format of a role ordered, variable clustered matrix is presented in Table 4.2.

Table 4:2 Role Ordered, Variable Clustered Matrix: Best Practice (Format)

	Concept: Best Practice			
	Emerging Issues			
Informants	Senior Management Commitment and Participation	User Involvement	Education, Training and Support	Systems Testing
Senior and General Managers $S\&GM_1$				
$S\&GM_2$, etc.				
IT Staff IT_1				
IT_2, etc.				
Clinical Managers CM_1				
CM_2, etc.				

The results of the analysis were also checked and tested for validity and reliability by comparing them to the data collected from other sources of evidence. This process of triangulation strengthened the findings and ensured that they were accurate and reliable (Yin, 1994). The results of the case study analysis are presented in the following section.

4.5 RESULTS

The results of the interviews are broken down into five sections broadly reflecting the principal elements of the interview guide and where appropriate, have been further divided to address individual variables. The results are supported by specific comments and examples identified by informants.

4.5.1 Background to Case Study

Central Nottinghamshire Health Care Trust (Central Nottinghamshire Healthcare (NHS) Trust) was previously a directly managed Priority Care Unit (PCU) of North Nottinghamshire Health Authority (NNHA). The services it provides have not changed greatly as a result of the reforms of the 1990s however the autonomy and freedom which have resulted from becoming a Trust have meant a new approach to organising and utilising the Trusts resources and providing its services. The introduction of an internal market within the NHS and the purchaser/provider split has resulted in NNHA relinquishing control over its PCU allowing Central Nottinghamshire Healthcare (NHS) Trust to have a new provider role.

An important factor to note with Central Nottinghamshire Healthcare (NHS) Trust and Community Trusts in general is that they tend be responsible for a wide range of localities. In broad terms, the Trust deals in the areas of Mansfield, Ashfield, Newark and Sherwood and since the introduction of contracting has extended its catchment to include Nottingham City, Derbyshire and Lincolnshire. However, the Trust has multiple locations for its services within these areas having five Community and General Hospitals with acute services at Newark, 41 Health Centres and Surgeries, seven Mental Health Units and further premises for People with Learning Difficulties and Child and Family Therapy Units. As well as Trust held surgeries and health centres there are also several GP Fundholding Practices that hold contracts with the Trust to provide services like practice nurses. In demographic terms the Trust serves a population of around 300,000.

Principally Central Nottinghamshire Healthcare (NHS) Trust provides services in six main areas: Community Nursing and Rehabilitation Services; Acute Services at Newark General Hospital; Learning Disabilities Services; Health Care for the Elderly;

Children's Services; and Mental Health Care. The Community Nursing and Rehabilitation Services compose the largest service group in the Trust and are also the most common users of the CIS. These services involve District Nurses, Health Visitors and School Nurses whose roles cover many of the other service activities provided by the Trust. The Trust is intending to review and reform District Nursing work placing a greater emphasis on specialist work and improving the current skillmix. In addition, at the time of the interviews the Trust was implementing a new approach to clinical working practices adopting a care programme and care aim approach. Consequently, clinical staff were starting to focus more on the outcome of interventions rather than simply delivering care to patients and this was reflected in the way the CIS collected information.

The Trust's CIS supplier, Systems Team were contracted to supply a system known as OS2.1 in February 1996. This version of the system was sold to the Trust on the understanding that it would achieve some but not all of the Trust's original specifications. The Trust bought the system with the knowledge that OS2.1 had been installed and was working at five other sites in the country. It was agreed that the remaining specifications would be met by a new version of the system, OS3.0 that would be ready in September 1996 in time for the Trust wide roll-out of the system. Unfortunately, this deadline was not met and consequently it was not possible for the Trust to continue with the roll-out of the system. Significantly, it was the later version of the system that was to provide key benefits to the clinical users. In three key areas, recording patient activity on the palmtop, referrals to other Health Care Professionals (HCPs) and the use of data questionnaires/assessment forms on the palmtops the system did not function.

At the time of the interviews the revised version OS3.0 was still awaited. However, an intermediate version of the system had been written by Systems Team plc. This version, OS2.2+, was intended to provide benefits in recording patient activity history on the palmtop and assessment/questionnaire forms and was envisaged to allow some staff to deliver end of month reports. Although the OS2.2+ version had not undergone external testing the Trust decided to upgrade to this new version after performing their own in-house testing and essentially took on a 'guinea pig' role. The decision

was taken to implement the intermediate version in order to avoid losing the momentum created for the project.

4.5.2 Introductory Questions

This section was largely intended to gather some background information about the informants and to get them used to talking and answering questions about the CIS. The responses to these introductory questions were that generally all the staff in the Trust were keen to be involved with the system and that there was a collective feeling that the CIS would be of value to the majority of staff. There were expectations that the CIS would provide more accurate and timely information for both clinical staff and management, improving the delivery of patient care, contracting processes and overall resource allocation.

Aims of the CIS

Apart from these initial impressions the main output from the introductory section was to identify the principal aims that had been set for the CIS at Central Nottinghamshire Healthcare (NHS) Trust. Four aims were identified by informants, these being:

- providing better patient based information for clinical staff;
- enabling the sharing of information between different healthcare professionals to facilitate holistic delivery of patient care;
- improving the provision of management information for contracting, budgeting and resource allocation;
- providing the Community Minimum Data Sets (CMDS) that were, at the time of the interviews, expected to be implemented from 1 April 1998.

It was noted by several informants (1, 2, 4, 5, 7, 11) that prior to the arrival of the information system, very little information had been collected about the operation of community nursing services and consequently, there was little evidence to

demonstrate how resources are allocated within this service. It was envisaged that the CIS would provide a valuable measure of activity in this particular service and would enable the Trust to be in a stronger position to defend and justify its expenditure to health commissioners and GPs in the future.

It was also interesting to note that in discussing the aims of the CIS with senior and general managers, these informants tended to focus more on the practical uses of the information for clinical staff (1, 2, 3) rather than central returns or management information, although these aims were also clearly identified. Similar comments were made by the clinical managers (12, 13) however, in contrast the IT informants tended to focus more on the need to provide the CMDS and management information as the main drivers behind purchasing the information system (5, 7, 8). This difference suggests that the senior managers in the Trust had identified the wider implications and possibilities for the use of the information system in supporting the delivery of patient care, but that this vision was less prominent among the IT staff who were primarily concerned with the mandatory national data requirements.

4.5.3 The Adoption of Best Practice at Central Nottinghamshire Healthcare (NHS) Trust

The following sections address each of the variables that were most consistently mentioned by informants during the 'best practice' section of the interviews and were considered to be important to the success of a CIS: senior management commitment and participation; user involvement; user training/education and support; systems testing; and positive user attitudes. Whilst other variables were identified by informants, (for example, good project management and effective communication) it was clear that these five variables stood 'head and shoulders' above the rest. Consequently, only these five variables are discussed in the following sections.

Senior Management Commitment and Participation

It was clear from comments from the majority of the informants that there had been high senior management commitment and participation for the CIS project (1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13). This commitment had been manifested in the actual purchase of the system and a clear desire to improve the methods of data collection for both staff

and management in the Trust. In addition, some members of senior management had sat on the Project Board for the CIS and senior clinical managers had also been involved in Professional Group Meetings to discuss the operational development of the system and its impact on professional issues.

Several informants stated that they considered senior management commitment to be particularly important in ensuring that the CIS was a success (3, 5, 6, 7, 9, 10, 12). It was stated that this commitment had been manifested through the provision of adequate resources to support the implementation process (6, 7, 10, 11, 12). It was noted by informants that resource levels had risen during the project due to unforeseen costs such as extra clerical support and training time and it was reported that senior managers had facilitated the provision of extra financial resources to address these issues. Consequently, additional IT support was provided for the users and it was possible to appoint a second trainer to help with the CIS implementation (6, 7, 12).

Another positive benefit of senior management commitment to the CIS project was the high profile support that was provided for the system (7, 9, 12). This support sent out a positive message to users about the system and the benefits that the system can provide. It was thought that senior managers needed to emphasise the vision of the CIS and that this encouragement would be important in motivating staff to become involved in the development project. For example, informants made the following comments:

> *'I think the extra resources have shown that they [senior managers] are committed to the system. The fact that they have made the money available to help with the clerical inputting has been a big plus for clinical staff. It sends out a positive message that we are serious about the CIS' (12);*
>
> *'I think the users have more faith in the project if they know that senior managers are committed to it. I think they [senior managers] are in the best position to sell the vision of the system to staff' (7);*
> *'If senior management don't back the system then it will never get off the*

ground' (13).

Consequently, the evidence provided by the informants suggests that senior management commitment and participation is important to the successful development and implementation of a CIS.

User Involvement

Several informants indicated that they felt there had been insufficient pro-active involvement of users at the outset of the CIS project and that this lack of involvement had hindered the implementation of the system (1, 2, 4, 7, 9, 10, 12). It was noted that the first project manager had provided the majority of clinical and professional input to the CIS project and as a consequence it was thought unnecessary to involve other clinical staff at the outset of the project. Once the project manager left the Trust the level of user involvement had increased significantly. This improvement in user involvement was reflected in informants' comments. For example, in response to a question asking whether there had been adequate pro-active user involvement during the CIS project, informants stated:

'I wouldn't have said so, not at the beginning. I think that has improved now especially over the last six months. I think originally it was very much one person's particular model and I think we recognised that the model would not be valuable to anybody within the Trust. We realised that the users needed to feel that they were being listened to.' (10),

'Not as much as they should have been, no. I think during the development stage we had the Assistant Director of Nursing on the Project Team who has left now, she was our clinical and professional input. We didn't have enough involvement from the Community Service Managers. We started user groups belatedly, after the pilot, but we are now using people more effectively and involvement has improved.' (9),

'Not to start with. I think too much emphasis was put on an individual person who worked within the Nursing Directorate who was developing the system in

> *the way she felt, rather than accurately reflecting the views of staff out in the field. I think we have learned from that I think now we have got the balance better.' (4).*

Several informants commented that they thought user involvement was important to ensure that the CIS was developed successfully and that the subsequent increase in user involvement had been helpful in implementing the system. By the time of the interviews several user groups and professional development groups had been established and these groups were thought to be helpful in the smooth running of the project and had pre-empted some potential problems, such as user resistance. The Director of Corporate Affairs stated,

> *'The involvement of users has been particularly important. I think the whole thing [CIS project] would have ground to a halt if we hadn't got them involved'(3).*

Consequently, these results also suggest that user involvement is important to CIS success and can be helpful in avoiding user resistance and facilitating a smooth implementation process.

Education, Training and Support

Prior to the start of the training considerable effort was made by the Trust to assess the IT knowledge of clinicians through means of a survey conducted by the Organisational Development Manager and the IT Trainer. This process was considered particularly important because it ensured that the training was tailored to the skill levels of the user population and helped to allay staff fears about the system. The project manager stated that:

> *'We actively went out there, found out what their [clinicians] fears were, and built up the training around that. We made no assumptions' (6).*

All the informants agreed that the provision of training was a vital element in getting staff to accept the system with comments such as:

> *'It's probably the most important feature of the implementation process' (3)*
> *'It's vital. It's not just been perceived by me as being vital, it's been held to be very important by the Trust so it has been one of the issues they have been prepared to give time and effort to and the staff have had much more training than that done by other Trusts' (9).*

These comments were supported in the evaluation of the pilot with users praising the training that they had received. It was noted that,

> *'Staff found the training sessions invaluable in picking up the system and having training palmtops with dummy patients to take away between sessions helped them understand the system' (Project Assurance Team, 1997).*

The only criticism of the training, made by two informants (2, 12), was that it had not addressed the concepts and the role of the CIS within the overall workings of the Trust when the training first started. The need for this 'wider picture' element was subsequently added to the training and it was felt by 8 informants (2, 3, 4, 7, 8, 9, 10, 12) that this element now constituted the most important part of the training. It was also felt that the concepts training was vital in terms of preparing staff for changes in their working practices and encouraging them to think differently towards their work and the role the CIS will play in it (10).

It was also noted that the training benefited from a lot of clinical input as well as the necessary input from the IT department. The training needed to be well structured and it was important that any queries should be given a *'positive, quality response immediately'* (5). The training was given a considerable emphasis at Central Nottinghamshire Healthcare (NHS) Trust and it was perceived as one of the most important and successful elements ensuring that the system itself was a success. It would appear that the provision of good quality training would be the main mechanism for ensuring a smooth change process in terms of users working practices, while maintaining positive user attitudes. Consequently, the experiences at Central Nottinghamshire Healthcare (NHS) Trust would suggest that for user training to

maximise its effectiveness in ensuring system success, it needs to be well structured, take account of variations in the skill levels of users and address the wider concepts upon which the system is designed, such as new working practices. Furthermore, if the training can be provided with a high clinical input then it is likely to be more positively received by clinical staff, than if it is purely delivered by non-clinical IT staff.

Closely linked to the issue of user training was the support that was provided to users after they had completed the training. Five informants (5, 6, 7, 10, 13) stated that user support was particularly important to ensure that once staff completed their training and went into the field with their palmtop computers they did not feel isolated and without help should they need it. For example, informants made the following comments:

> *'We had a lot of back up and support out in the field from the trainers and I think that helped the staff who were slower to pick up the system.' (4);*

> *'I think the on-site support has been invaluable' (10).*

The main benefits from this comprehensive support element provided at Central Nottinghamshire Healthcare (NHS) Trust were in terms of confidence and reducing the fear of technology for users. It was noted by the CIS Project Manager (6) that the characteristics of the user population were that staff typically had very little experience of information technology, were very fearful of getting things wrong and had little confidence in their own ability to be able to adapt to the new ways of working using the CIS. Consequently, a friendly and approachable support element was considered very important in this environment in order to cultivate a more relaxed and positive attitude towards the CIS. The IT trainer supported this view commenting,

> *'I think the support is giving them confidence and allaying their fears by reassuring them that we are there to help should they need it' (9).*

The evaluation of the pilot also emphasised the importance of user support and reported that the user support had been well received and was thought to be effective. It was also noted that as staff become more familiar with the system and particularly the palmtop computers so the requests for support have fallen with staff able to rely on their immediate colleagues as a first line of help. The report concluded that on the basis of the pilot *'training and support will continue to be crucial in the success of the system during roll out'* (Project Assurance Team, 1997).

Consequently, it would appear that user support is also considered as very important to the success of a CIS, with good user support thought to be reinforcing staff confidence in the system and ensuring the CIS project retains credibility and priority throughout the Trust.

Systems Testing

Finally another issue that was identified by several informants as being an important element of best practice for implementing a CIS was comprehensive systems testing (3, 5, 6, 7, 8, 9). Informants commented that although they had bought a package rather than developing a system themselves, they had found through bitter experience, not to assume that the package purchased would be able to perform to the specifications advertised. Informants made the following comments:

> *'What the Trust was expecting to receive and what they were actually sold were two very different systems. We only found that out when we started to use the system and that resulted in a delay and the pilot running for far longer than we intended' (6),*
>
> *'The system didn't deliver at all in terms of our expectations' (3),*
>
> *'If you imagine we asked for a system with the capabilities, A, B, C, D, E and F then the system that actually arrived could only provide A, B and C in terms of its actual functionality. All the benefits for clinical users were wrapped up in the non-functional aspects of the system. So that was very disappointing for the users' (7).*

Following this bad experience, Central Nottinghamshire Healthcare (NHS) Trust agreed to receive an upgrade of the original version of the CIS that was first delivered. This upgrade was supposed to perform to the expectations set for the original version and after considerable testing in the Trust this version was accepted and was eventually implemented across the Trust. However, this experience emphasised the importance of comprehensive testing to ensure CIS success. The CIS project manager (6) concluded:

> *'The testing is absolutely vital. We purchased our CIS from one of the leading suppliers and look at the problems we've had. If we had tried to roll-out the system in the form it arrived in, it would have been a complete disaster.'*

Consequently, it would appear that even when buying a package from a leading supplier, comprehensive systems testing is still required to ensure that the system will work in the actual environment. To not perform system testing, runs the risk of implementing a system that will not meet the desired expectations of users or managers which is likely to have negative implications for the success of the system.

Positive User Attitudes

The importance of positive user attitudes was another issue that was frequently mentioned by informants during the 'best practice' section of the interviews. It was noted from the analysis that informants recorded mixed views about user attitudes at the start of the CIS project with six informants (3, 5, 7, 9, 10, 12) believing user attitudes were positive but seven (1, 2, 4, 6, 8, 11, 13) reporting either negative user attitudes or indifference towards the system. When user attitudes were thought to be less positive about the system the reason was usually explained as a product of fear of the unknown and a suspicion of whether the system would provide any tangible benefits for staff. For example, one clinical manager (13) stated:

> *'I think at the outset there was a lack of understanding, no knowledge, a lot of scepticism and a lot of fear. I can think of one Health Visitor who said, "Well, I shan't be here when this comes anyway and retired." So I would say user*

attitudes were very sceptical at the outset, because of the unknown.'

Informants (6, 7) stated that this lack of positive user attitudes from the user community was identified as a potential problem within the CIS Project Team as a series of road shows were conducted to inform staff about the system prior to its implementation. It was also identified that during the project user involvement had helped to reduce user fears of what the system would involve. It was considered by the majority of informants (1, 2, 4, 5, 6, 7, 8, 11, 12, 13) that these methods had been effective in improving user attitudes and the majority of informants stated in the interviews that they felt that user attitudes had become more positive since the start of the CIS project.

In addition, the CIS Project Manager (6) indicated that as the roll out of the CIS progressed, more clinical staff had been involved with the system and consequently the emphasis from the IT department had been reduced. This dilution of involvement from the IT staff and the increase in the number of clinical users with a working knowledge of the system, was thought to be generating positive attitudes among the users. It was hoped that as the roll-out continued so user attitudes should become more positive, the IM&T Manager (5) commenting, '*I think people will rise to become champions, if you like, to support the system'*.

It would appear that developing positive user attitudes were also considered by informants to be particularly important in ensuring CIS success. Considerable effort seems to have been made within the Trust to try and generate more positive attitudes towards the system with the use of road shows and user involvement seen as the main facilitators. The development of positive user attitudes are then thought to be having a direct positive impact on the effectiveness of the CIS. The importance that informants placed on achieving positive user attitudes provided strong evidence to suggest that this variable should also be investigated in the later stages of the research.

4.5.4 The Organisational Impact of Implementing a CIS at Central Nottinghamshire Healthcare (NHS) Trust

As has been indicated in section 4.3.1, the CIS was in the process of being

implemented across the Central Nottinghamshire Healthcare (NHS) Trust at the time of the interviews. Consequently, the level of organisational impact was fairly modest at the time when staff were interviewed. Therefore, when informants discussed the areas of organisational impact engendered by a CIS they were asked to refer to areas of envisaged as well as actual impact. By contrast to best practice, the researcher ensured that the discussion concerning organisational impact was more focused towards the six areas identified in the literature review. However, as well as these areas, a further issue, user ownership was also frequently mentioned by informants at this point during the interview. For clarity, each variable will be reviewed individually.

Working Practices

At the time of the interviews no changes in management working practices had been experienced. However, it was noted that for at least six of the informants (1, 5, 6, 7, 8, 9) changes in their working practices as a result of the implementation of the CIS were unlikely due to the nature of their work. In contrast eleven of the informants (1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12) felt that the CIS was having an effect on nursing working practices and would continue to do so in the future.

In terms of changes in nursing working practices it was noted by informants that changes had occurred, with nurses beginning to use the care objective and care programme approach, and beginning to think differently in respect to how they carry out their work, focusing more on outcomes of care delivery (6, 7, 9, 10, 12, 13). It was noted in the pilot evaluation report that staff did not have any difficulties in adopting the principle of a care objective and a care programme, although some initial problems had been encountered with regard to lack of written, tested guidelines on the use of the new concepts and some coding issues (Project Assurance Team, 1997). It was thought that the nurses had become more responsible for their own data (5, 6, 7, 10, 12) and as a result were beginning to question why they were collecting certain data and refining the collection accordingly. It was also stated that the CIS had changed systems of administration and would allow some staff to reduce the amount of paperwork they have to do (4, 9). Overall it was felt that these changes in working practices had not been planned beyond the introduction of the care aim and care

programme approach, although it had been acknowledged and discussed that some changes in working practice were likely.

It was thought that the CIS would provide users with the opportunity to improve their performance and change their working practices accordingly, although these changes were not expected in the short term (1, 4, 5, 7, 8, 13, 10). For example, a community service manager (13) commented,

> *'Yes, I think these changes will allow staff to improve their performance. The CIS will give them [clinical staff] more information about how they are delivering care and will provide them [clinical staff] with more opportunities to reflect on whether they are doing their work in the most effective way.'*

Generally, it was considered that the implementation of the CIS was challenging existing working practices and that this was beneficial to the staff concerned and to the Trust as a whole. It was noted that changes in working practices within the NHS were an ongoing process, however, it was felt that the CIS had acted as a catalyst for some changes, such as the introduction of national guidelines on care objectives and care programmes as well as facilitating the critical reviewing of traditional care delivery practices. (3, 4, 5, 10, 11, 12 ,13).

Changes in the Flow of Information

There was a unanimous view from informants that the CIS would change the flow of information within the Trust. It was thought that prior to the implementation of the CIS there was very little sharing of information and *'that information only flowed to where it needs to'* (2). It was envisaged that the implementation of the CIS would mean that that the information entered on the CIS would be *'instantly available'* (8), there would be a *'reduction in paperwork'* (5) and information would be *'accurate, timely and accessible to field staff'* (12).

It was expected that these changes would result in staff placing greater value on both the new information and therefore the CIS, enabling them to review and assess their clinical practice more effectively. It was considered that if these benefits could be

achieved, particularly in the view of the front line clinical staff, then the system would be a long way towards being viewed as a success. In addition, changes in the flow of information were also identified as having potential impacts on the level of user empowerment achieved. This issue is reviewed in more detail in the next section.

Empowerment of Users

The empowerment of users was also clearly identified by informants as an aim that had been set for the CIS and the majority of informants thought that the system would facilitate greater empowerment in the future (6, 7, 8, 10, 12, 13). For example one informant (8) commented:

> *'Well, because the system will give them more information they [clinicians] will be in a better, more informed position to make decisions. In that respect I'm sure it [CIS] will help empower staff in the future.'*

The importance of achieving empowerment was closely linked by the CIS Project Manager (6) to the success of the CIS, identifying it as a significant benefit that the users would be expecting. It was considered that if some degree of empowerment was not achieved then the system was likely to be viewed as a failure, particularly by the clinical staff. The project manager (6) stated that:

> *'The Trust has really placed so much emphasis on the return of benefits to staff that if the system fails to produce those benefits then the system will fail and the only way to achieve those benefits is through empowering staff'.*

Consequently, it is clear that informants at Central Nottinghamshire Healthcare (NHS) Trust considered achieving user empowerment to be a likely impact from implementing a CIS. User empowerment requires good access to information for staff and when achieved should provide considerable benefits for staff. Consequently, it would appear that achieving high levels of user empowerment may also increase the likelihood of a CIS being viewed as a success.

Changes in Organisational Culture

It was evident from the interviews that informants from all aspects of the Trust thought that the implementation of the CIS would result in significant changes in the organisational culture of the Trust (3, 5, 6, 10, 11). The main area of change that was expected in the Trust was the development of a more information focused culture that facilitated the improved delivery of patient care. This impact was expected to be experienced most by the clinical staff as it was believed that the CIS project was involving them to a far greater extent than any previous IT Project. The IM&T Manager (5) commented:

> *'I think that culture change has already started, with the proliferation of email and networking and the joining of people together so that they can communicate. I think there is an information culture that is starting now and I think with the introduction of the CIS the actual practitioners feel that they are being involved in that, more so than they have been in the past.' (5).*

It was also argued by the IM&T Manager (5) that this change in organisational culture had been planned and that the involvement of the Nursing staff had been crucial to this process. It was thought important to ensure that the Nursing staff had maximum exposure to the system in its development and implementation and ensure that this change would be of major benefit to them.

However, it was also noted that it would be important to avoid developing a 'blame' culture or use the CIS as a policing tool as these changes, may have detrimental effects on the attitude of staff towards the CIS. This fear of developing a 'big brother' culture was highlighted by one clinical member of the pilot staff who commented during the evaluation interviews that *'it felt like every minute of the day had to be accounted for.'* (Project Assurance Team, 1997).

The majority of informants thought that understanding the Trust's organisational culture was very important in ensuring the success of the CIS (2, 3, 4, 5, 6, 7, 11, 13). The Director of Corporate Affairs (3) indicated that understanding the organisational culture and changing it when appropriate was important to develop support for the

system from staff. He stated that:

> *'If people believe that we are only implementing the CIS so that we can collect contract information then they'll have limited interest in it and limited desire to co-operate with us. If they take on the cultural driver that the CIS will allow them to do their jobs better then they will accept the system and make it a success' (3).*

Consequently, the results from informants at Central Nottinghamshire Healthcare (NHS) Trust suggested that the introduction of a CIS within a Community Trust would have an impact on the organisational culture of the Trust. In addition, depending on what type of change occurs, whether it results in a positive 'information' culture or a negative 'blame' or 'big brother' culture, would have significant implications for the overall effectiveness of the system.

Organisational Processes

When discussing changes in organisational processes informants commented that there had been few changes but that they expected some organisational processes to change in the future (2, 3, 5, 7, 10). It was stated by one informant (7) that the introduction of contracting and the creation of fundholding GPs meant that there was an increasing demand for the Trust to be able to produce regular, accurate information. This increased demand for information from GPs and the Health Authority was one of the drivers for the purchase of the CIS. It was envisaged that once the system was fully implemented it would enable improvements in contracting processes and improved relationships with GPs. For example, one informant (7) commented:

> *'The new information we are collecting with the CIS will mean that contracts will now reflect what our staff actually do. We will be in a far more informed position to negotiate contracts and to tell GPs what they are paying for. So we will be able to point and say, 'this is what a District Nurse has been doing for you over the last year, it costs this much'. It will make the whole contracting process a lot clearer, hopefully a bit easier.'*

Other minor changes were also expected in the way some departments co-ordinated their work (4) and the way data were collected and collated (8) but no specific examples were given. It was observed that throughout the NHS information and the use of information technology was taking greater priority than ever before and that meant that Trusts were now being encouraged to invest in systems such as the CIS. Consequently, it was thought that further changes could be expected in the future as much because of the dynamic nature of the NHS, as due to localised changes within the Trust. It would appear that there had been relatively little change with regard to existing organisational processes at Central Nottinghamshire Healthcare (NHS) Trust and although changes were expected in the future, the precise nature of these changes is not clear. However, it would appear that should the CIS improve the contracting process it will have achieved one of its major aims and therefore is more likely to viewed as a success. In this respect, changes in organisational processes would seem to have some influence over system success.

Organisational Structure

Informants noted that there had been some changes in organisational structure since the implementation of the CIS. It was stated by the Director of Corporate Affairs (3) that there had been a reorganisation of the management structure of the Nursing Directorate and the responsibility for the CIS within this Directorate had been changed to involve middle managers as well as directors and assistant directors. However, it was unclear whether these changes had been a product of the CIS or whether they were part of the normal evolution of the organisation. Other informants indicated that they were not sure whether future changes in organisational structure would occur as a result of the CIS (10, 7). However, it was suggested that the new information provided by the CIS may be used as a basis for future changes, such as possible mergers with neighbouring Trusts (7).

Consequently, it would appear that changes in organisational structure may occur as a result of the implementation of a CIS but that these changes are more likely to be long term impacts that will only be seen in Trusts that have had a system fully implemented for some time. The results from Central Nottinghamshire Healthcare

(NHS) Trust were inconclusive regarding the existence of a relationship between changes in organisational structure and system success.

User Ownership

The concept of user ownership also emerged during the interviews with informants from all three staff groups (3, 5, 6, 7, 10, 12) identifying user ownership as being particularly important because it would provide significant benefits for both the system and the Trust as a whole. For example one informant commented:

> *'Ownership is one of the things that we are totally determined to do and we are already succeeding in that respect by making the users responsible for their data.' (5).*

Several key benefits were expected by informants once user ownership was achieved, the principal one being an improvement in the quality of the data recorded on the system. It was thought that if the users had a sense of ownership over the data that was being entered on the CIS and viewed the output of the CIS as being their information, for their clinical use, then the users would be more inclined to enter data more accurately. For example, informants commented:

> *'Achieving user ownership will mean that we are getting the Nurses putting in their own data. The Nurses checking their data. They are seeing the problems and they are making it more accurate, they are making it more useful.' (6)*

> *'If the users don't own the system then they won't put the data in accurately and the system and the data won't be of use to anybody.' (12)*

It was thought that achieving user ownership would ensure that users would have a vested interest in the system and have the power to argue for the data collection format to either be altered or increased so that they would have access to more valuable information: *'A key part of ownership is recognising that you can change something if it is not working that well'* (4). It was then expected that staff would make more use of the information, assessing their personal working practices and

making improvements either clinically or non-clinically to ensure that they were working as effectively and providing the best possible care for their patients.

It would appear from the comments of informants concerning user ownership, that this variable was considered to be particularly important to the success of a CIS. User ownership was expected to help improve data quality and encourage clinical staff to review and improve their clinical practices, that in turn was thought to increase the likelihood of system success. Consequently, the experiences at Central Nottinghamshire Healthcare (NHS) Trust would appear to suggest that user ownership should also be investigated as a factor influencing the success of a CIS in the later stages of the research.

4.5.4 Technical Aspects of the CIS

The final main section of the interview concerned informants' views on more technical aspects of the CIS to explore whether they considered technical issues to be having a significant impact on the overall success of the system. Informants were asked about the ease of use of the CIS, technical problems associated with the CIS and maintenance costs.

The majority of informants thought that the users had got used to using the palmtop computers quite easily and had few problems (1, 3, 5, 6, 7, 8, 9 10, 11, 12). It was indicated that staff generally were at ease with using them once they had undergone the training and were using the equipment in their work environment. This point was strongly supported by evidence from the pilot evaluation which noted, '*the palmtop computers have proved easy to use with few initial fears being realised in this area.*' (Project Assurance Team, 1997). In addition, the fact that a large number of staff were using the palmtops meant that most staff were in a position to consult with their immediate colleagues in the first instance should a problem arise and this peer support coupled with the IT help desk was making the transition for staff fairly painless (5, 6).

The informants were less positive about the CIS when it was used on a desktop computer (5, 7, 8, 9). The user sees the CIS in more detail when using the desktop computer and the character based design has not been well received among staff.

Particular attention was paid to problems when trying to correct errors on the system and generally the CIS was considered unfriendly through this medium. The CIS project manager (6) qualified these problems by stating that one of the problems with the main system on the desktop computer was that it was not possible for the IT Department to make alterations to the system on site and that any problems, such as the order of the error correction screens, could only be altered by the system supplier. However, the Project manager also indicated that the CIS on the desktop had not been a significant problem in implementing the system because the majority of users only interacted with the palmtop version of the system that was greatly simplified and considerably easier to use.

Additional technical problems were also cited largely because of the system not being able to meet the specifications that had been set for it. Essentially the system that was delivered to the Trust in the first instance was considerably more basic than the version that was expected. Consequently, some developments of the system at the Trust were delayed, the principal effects of which resulted in the pilot being suspended and then conducted for a considerably longer period than was first intended. However, the system was subsequently upgraded and therefore these technical problems were also only experienced in the short term. It was thought by informants (6, 7, 9, 10, 12) that technical problems, such as those experienced at the time of the interviews, would only have a detrimental impact on the overall perceived success of the system if they continued in the long term.

Although the system was only partially implemented at the time of the interviews there was little evidence from informants to suggest that technical issues would have a long term effect on the overall perceived success of a CIS. It was thought that the majority of technical problems would be resolved in the first year of the system being fully implemented and that teething problems were to be expected (5, 6, 7, 10). It was thought that this view was understood by staff and that they would be patient while such teething problems were resolved. However, it was acknowledged that should technical problems persist in the day to day use of the CIS, then the systems level of success would correspondingly fall.

4.6 SUMMARY OF EXPLORATORY RESEARCH FINDINGS

The findings of the exploratory research provide some interesting and helpful insights with regard to the adoption of best practice and the organisational impact resulting from the implementation of a community information system.

As was stated at the outset of this chapter, one of the key aims of the exploratory research was to identify those best practice variables that were considered most important to CIS success. In analysing the interviews, four elements of best practice were regularly identified by informants, namely: senior management commitment and participation; user involvement; user education, training and support; and systems testing. The literature review has shown that all of these variables are supported in the literature as being elements of best practice that are important for successful systems development projects. Furthermore, all these variables have been included in the NHS's own list of best practice variables for the implementation of Hospital Information Support Systems (National Audit Office, 1996). In addition, during the discussion of best practice, informants frequently mentioned the importance of positive user attitudes in ensuring a successful CIS. Whilst not being widely recognised in the literature as a key element of best practice, positive user attitudes have been identified as having an important influence on the ultimate success of an information system (Lucas, 1978; Lucas, 1981; Zmud, 1983; Joshi, 1990). Consequently, the results from the exploratory research and the existing literature provided evidence to suggest that positive user attitudes should be included as a fifth element of best practice.

Another aim of the exploratory research was to investigate the key areas of organisational impact that occurred as a result of the implementation of a CIS. Although the community information system at Central Nottinghamshire Healthcare (NHS) Trust was only partially implemented at the time of the interviews, informants identified several areas of organisational impact that had already occurred. It was reported that there had been changes in clinical and non-clinical working practices and that the organisational culture of the Trust had also changed. It was stated that the Trust's culture was now becoming more information focused, with a greater staff interest in using IT and information to improve the delivery of patient care.

Furthermore, informants frequently mentioned that high levels of user ownership were developing at the Trust. User ownership was considered to be helping to generate better data quality and encouraging staff to review and improve their clinical practice. In addition, several other organisational impacts were expected in both the short and long term including higher levels of user empowerment, positive changes in the flow of information and positive changes in organisational processes.

Many informants also commented that they thought the areas that experienced high levels of organisational impact could have a crucial effect on system success. It was thought that positive changes in working practices and organisational culture and the development of user ownership were already having a positive influence on the system. In addition, future changes, such as user empowerment, were also considered likely to have a positive impact on the CIS. This evidence suggests that there may be a relationship between organisational impact and CIS success.

The existing research, discussed in the literature review, identifies that changes in working practices, the flow of information, empowerment, organisational culture, organisational processes and organisational structure are all areas that are likely to experience high organisational impact following the implementation of an information system. Consequently, the findings from the exploratory research provide evidence to support existing theory with regard to changes in working practices and organisational culture. The findings also provide some support for changes in other areas, such as user empowerment and organisational processes, however, this evidence is based on expected rather than actual change experienced at Central Nottinghamshire Healthcare (NHS) Trust and must be treated with more caution. However, as has been indicated a further issue, user ownership was identified by informants when they were discussing the organisational impact of the CIS. Whilst, user ownership has not been widely recognised in the literature as a common area of organisational impact following the implementation of information system, it has been found to influence system success (Markus, 1983; Van Alstyne et al., 1995). Furthermore, Beynon-Davies (1995) identifies a lack of user ownership as one of the causes of the failure of the London Ambulance Services Computer Aided Dispatch project. Consequently, the exploratory research and the existing literature provide

sufficient evidence to suggest that user ownership should be included with the other six areas of organisational impact for further investigation in the later parts of the study.

Furthermore, the exploratory research has also provided some evidence to suggest that the level of organisational impact may have an influence on system success. Several informants commented that they thought the changes in working practices, organisational culture and user ownership were having a positive impact on the system and that they expected future changes to have similar positive impacts. Venkatraman (1991) has suggested that such a relationship may exist, with higher levels of organisational impact leading to greater organisational benefits and therefore system success. However, as has been indicated in the literature review, few studies have addressed this relationship in more depth. Consequently, the exploratory research has also provided evidence to suggest that the precise nature of this relationship between organisational impact and system success requires further investigation.

Finally the results from the interviews provided strong evidence to suggest that in the case of Central Nottinghamshire Healthcare (NHS) Trust, technical issues were not likely to influence the eventual level of effectiveness associated with the system. It was argued by informants that technical problems would only be a short term issue and that organisational issues would have far greater significance to the long term success of the CIS project. Consequently, it is suggested that this evidence, along with the evidence of many existing studies (for example: Lucas, 1975; Hornby et al., 1992; Ewusi-Mensah and Przasnyski, 1994; Ahn and Skudlark, 1997), provide a strong argument for not studying technical issues in the later stages of this study.

The exploratory research has provided an in-depth study of a Community Trust's experiences in development and implementation of a community information system. It has also provided additional evidence to justify the inclusion of several best practice and organisational impact variables in the remaining two stages of the study. The findings from this stage of the research have been published in Coombs et al. (1998b).

The following sections discuss the revised research framework and objectives that were developed in the light of the exploratory research findings.

4.7 DEVELOPMENT OF ADDITIONAL RESEARCH OBJECTIVE

The purpose of this section is to critically review the relevant IS literature in the light of the findings from the exploratory research and identify the gaps that exist. These research gaps will serve as a further justification for conducting this research project. These research gaps will then be translated into an additional research objective for this study that will make a significant contribution to this research domain.

4.7.1 Critique of the Relevant Literature

The findings of the exploratory research provided some evidence to suggest that the organisational impact that results from the implementation of a CIS may influence the overall level of system success. This observation suggests that the organisational impact resulting from the introduction of a CIS needs to be carefully considered at the outset of a systems development project. The need to address the organisational impact that results from the development and implementation of an information system has been reflected in the literature, with the emergence of new research in this area. Several studies have identified the importance of organisational issues in systems development (for example: Lucas, 1975; Hornby et al., 1992; Ewusi-Mensah and Przasnyski, 1994; Ahn and Skudlark 1997) and Clegg et al. (1997a) have even suggested that these issues need to be institutionalised in IS practitioners' concept of best practice. However, it has been noted by Doherty and King (1998) that the literature pertaining to organisational issues is trivial in comparison to the attention given to other aspects of systems development and consequently this area urgently requires further research. Consequently, this research project specifically focuses on the role of organisational impact in CIS development projects, and how it can be effectively managed through the consideration of organisational issues to ensure a positive impact. It should be noted that for the purposes of this study organisational issues are defined as:

'Those issues which need to be assessed and effectively managed during the

systems development process to ensure that the impacts of the resultant technical system on the organisation and its employees are likely to be acceptable.'

This working definition of organisational issues has been adapted from work by Doherty and King (1997). The definition has two key elements with regard to organisational issues. Firstly, a systems development team needs to assess the likely or desired areas of organisational impact resulting from the introduction of an information system. Examples of these areas may include culture, the organisation wishing to develop a more information focused culture, or empowerment, the organisation wishing to encourage increased user empowerment. Secondly, having assessed and planned changes in organisational issues, then these issues need to be explicitly addressed and effectively managed in order for the desired changes in, say, organisational culture and user empowerment to be achieved. By following these two stages the development, implementation and operation of an information system is likely to result in a positive impact on the host organisation.

4.7.2 Additional Research Objective

As was indicated in the introduction to this chapter, two original research objectives were developed from the literature review:

1. To explore the relationship between the actuality of a CIS project team to adopt best practice and the resultant level of success or failure of the operational information system;

2. To explore the relationship between the level of organisational impact brought about by the system and the resultant level of success or failure of the operational information system.

As a result of the exploratory research findings and additional critique of the literature an additional research objective was defined.

3. To explore how the organisational impacts resulting from the development

and implementation of a CIS can be assessed and effectively managed to ensure that they are positive.

It was envisaged that this objective would enable the study to ascertain whether CIS practitioners assess the likely organisational impacts resulting from the implementation of a CIS or whether they leave the impact to chance. If the former approach is taken, then the importance of considering and addressing organisational issues during a systems development project to ensure a positive organisational impact will be explored. Similarly, it is also envisaged that this objective will allow the effects of not considering organisational issues to be investigated with regard to system success.

4.8 REVISED RESEARCH FRAMEWORK

The research variables relating to CIS effectiveness have been discussed in section 2.2 of the literature review, however, the variables relating to best practice and organisational impact are reviewed in the following sections. The aim of the following discussion is to identify the variables and justify their inclusion in the study. A discussion of their operationalisation for the second and third stages of the research is presented in chapters five and six that present the findings for each stage.

4.8.1 Variables Relating to Best Practice

The findings of the exploratory research identified six key best practice variables that were considered to be particularly important to a successful CIS development project and that have all been cited in the literature: **senior management commitment and participation** (Cerullo, 1980; Watson and Glover, 1989; Kaye, 1990; Watson, 1992; Sauer, 1993; Cooper 1994; Ewusi-Mensah and Przansnyski, 1994; Damodaran, 1996); **user involvement** (Doll and Torkzadeh, 1988; Tait and Vessey, 1988; Rousseau, 1989; Barki and Hartwick, 1989; Jarvenpaa and Ives, 1991; Wong and Tate, 1994; Damodaran, 1996); **user training** (Brady, 1967; Moran, 1981; Bronsema and Keen, 1983; Miller and Doyle, 1987; Cronan and Douglas, 1990; Hornby et al., 1992; Yaverbaum and Nosek, 1992; Whyte and Bytheway, 1996) **and user support** (Miller and Doyle, 1987; Bergeron and Berube, 1988; Nord and Nord, 1995; Govindarajulu and Reithel, 1998); **systems testing** (Burch and Strater, 1974; Ennals,

1995; Chen and Gough, 1995; Flowers, 1997) and **positive user attitudes** (Lucas, 1978; Lucas, 1981; Zmud, 1983; Joshi, 1990).

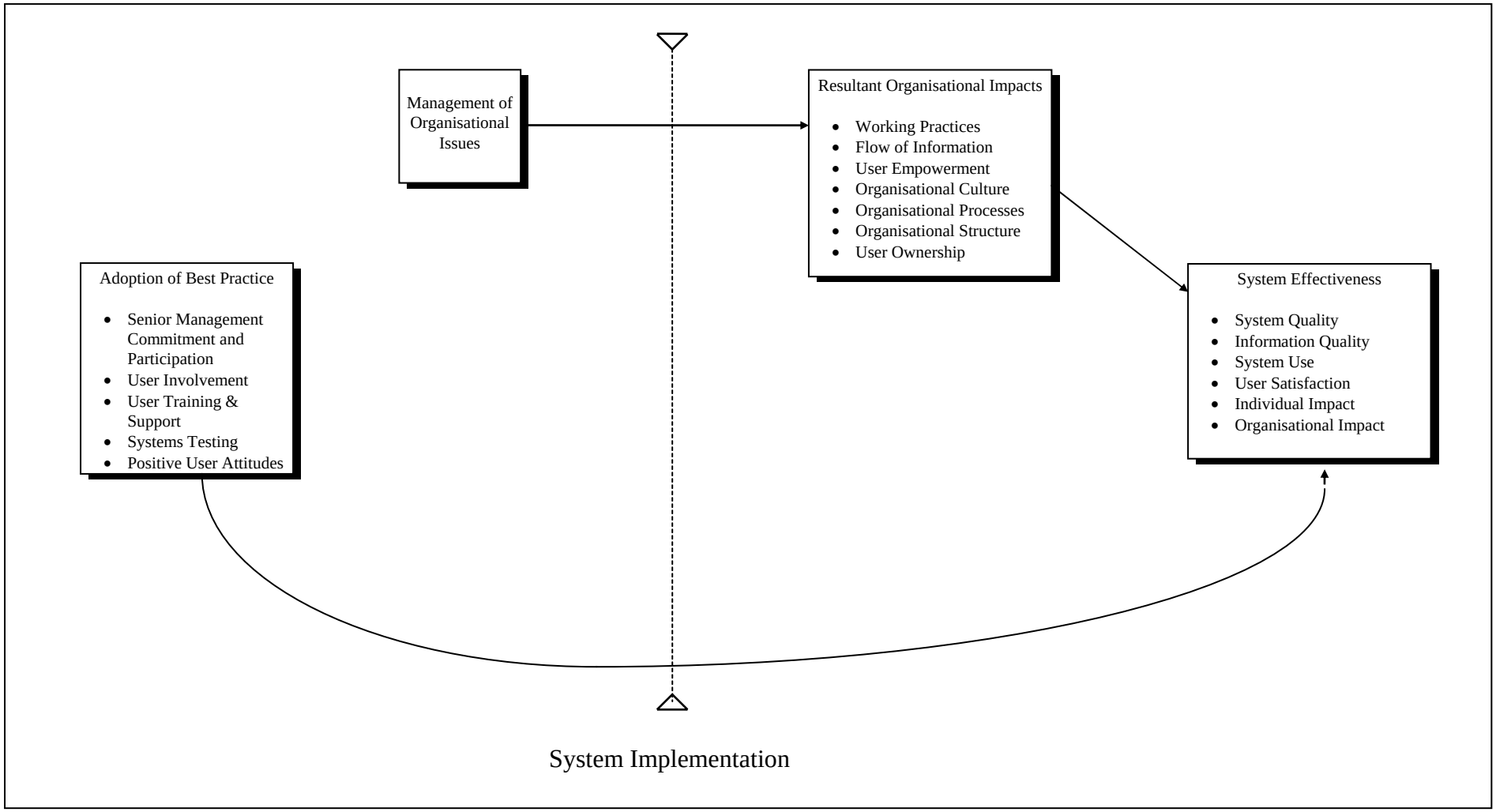
These six variables were clearly and consistently identified by informants within the case study as being the most important best practice factors for a successful CIS. Chapter two has provided a detailed review of senior management commitment and participation, user involvement, user training and support and systems testing in the context of existing IS research. The review has indicated that all these variables have been identified in existing research as elements of best practice, that if adopted, are likely to result in higher levels of system success. Similarly, positive user attitudes have also been identified in the literature as influencing information system success. The evidence of the exploratory research suggests these variables are important for successful CIS projects and this evidence as well as the existing literature, justifies their inclusion in this research. Furthermore, the fact that four of these five variables have been included in the NHS's own list of best practice variables for Hospital Information Support Systems, also helps justify their inclusion in the study (National Audit Office, 1996).

4.8.2 Variables Relating to Organisational Impact

The findings of the exploratory research provided empirical evidence that identified several areas of organisational impact resulting from the introduction of a CIS and these variables have also been regularly cited in the literature. For example, changes in: **working practices** (Bjorn-Anderson et al., 1979; Lyytinen and Hirschheim, 1987; Eason, 1988; Scott Morton, 1992; Bailey, 1993; Clegg et al., 1996); **flow of information** (Lyytinen and Hirschheim, 1987; Sauer, 1993); **user empowerment** (Lyytinen and Hirschheim, 1987; Hammer and Champy, 1990; Baxter and Lisburn, 1994; Cooper, 1994; Carroll, 1997; Wareham et al., 1998); **organisational culture** (Burch and Grudnitski, 1989; Walton, 1989; Pliskin et al., 1993; Holmes and Poulymenakou, 1996; Taylor-Cummings, 1998); **organisational processes** (Lyytinen and Hirschheim 1987; Davenport, 1993; Hammer and Champy, 1993; Fielder et al., 1994); **organisational structure** (Croswell, 1989; Scott Morton, 1992; Clegg, 1994; Stebbins et al., 1994; Raymond et al., 1995) and **user ownership** (Markus, 1983; Van Alstyne et al., 1995).

The fact that these organisational impact variables have been identified in the literature as being areas of impact that are likely to influence system success and the fact that the exploratory research supports these assertions with regard to CIS success, justifies their inclusion in this research. The fully detailed research model is presented in Figure 4.1.

Figure 4-1 The Research Model



4.9 SUMMARY

This chapter has discussed how the exploratory research was conducted, the main findings that were identified and how they related to the existing literature presented in chapter two. However, although providing useful insights into the development, implementation and operation of a CIS, the exploratory research has a number of limitations:

The Trust that participated in the exploratory research (Central Nottinghamshire Healthcare (NHS) Trust) had only partially implemented its CIS at the time of the interviews. Consequently, the informants at Central Nottinghamshire Healthcare (NHS) Trust were only able to draw on limited personal experience when commenting on the possible organisational impact engendered by a CIS.

In addition, because the system was only partially implemented at the time of the exploratory research, it was not possible to develop an accurate measure of the systems perceived level of success. Consequently, although strong indications were provided from informants as to the effects of adopting best practice and the level of organisational impact on success, it was not possible to fully test these relationships from the exploratory research.

The research has only examined the composition of best practice and the level of organisational impact in a single case study. Consequently, the findings from the exploratory research are limited in terms of their generalisability.

To address these limitations the next stage of the research, involved the use of a survey to contextualise the experiences recorded at Central Nottinghamshire Healthcare (NHS) Trust and to confirm that the variables identified in the exploratory research were also applicable in other Community Trusts. This second stage of the study is reported in the following chapter.

Chapter 5: Questionnaire Survey of Community NHS Trusts in England and Wales

5.1 INTRODUCTION

The previous chapter reported how several key variables were identified as forming the main elements behind the adoption of best practice and the level of organisational impact associated with the development, implementation and operation of a community information system. However, these variables have only been identified in the single case study and a lack of wider research meant that it was impossible to know whether these variables were considered of equal importance in the other Community Trusts in England and Wales that were also using a CIS. The results from the exploratory research needed to be developed in the wider context of all similar Community Trust experiences. Consequently, this chapter presents the results of the second, confirmatory stage of the research that investigates the variables identified in the literature review and exploratory research and determines their relevance to the overall success or failure of CISs in Community Trusts in England and Wales. Furthermore, the research also attempted to ascertain the uptake and application of CISs in England and Wales, thereby providing a contextual background for the exploratory research. Finally, the research framework and research objectives for the study are reviewed and refined in the light of the survey results.

This chapter begins by outlining the main objectives of the questionnaire survey and then explains the methodology adopted for developing the research instrument. Following this section the statistical methods that were used to analyse the responses are discussed and the results of the analysis are subsequently presented. A discussion of the research results is also provided and the chapter concludes by further developing and refining the research framework and research objectives for the final stage of the study.

5.2 SUMMARY OF OBJECTIVES FOR QUESTIONNAIRE SURVEY

Before discussing the more specific research objectives that were set for the second stage of the research, it is useful to remind ourselves of the overall research objectives:

1. To explore the relationship between the actuality of a CIS project team to adopt best practice and the resultant level of success or failure of the operational information system;

2. To explore the relationship between the level of organisational impact brought about by the system and the resultant level of success or failure of the operational information system;

3. To explore how the organisational impacts resulting from the development and implementation of a CIS can be assessed and effectively managed to ensure that they are positive.

As was indicated in the introduction to this chapter, the overall aim of the questionnaire survey was to confirm that the variables identified in the literature review and exploratory research were of relevance to other Community Trusts. This aim was to be addressed by comparing the practices and methods adopted at the initial case study site (Central Nottinghamshire Healthcare (NHS) Trust) with those in other Community Trusts. More specifically, the overall objectives, presented above, were extended into four second level aims, that are reviewed below:

1. To assess the level of adoption and importance associated with the key best practice variables identified in the literature review and at Central Nottinghamshire Healthcare (NHS) Trust in other Community Trusts. It was envisaged that these questionnaire items would provide an insight into whether best practice was being adopted at Community Trusts. It was also envisaged that the relationship between the level of adoption of best practice and the level of perceived success associated with the CIS could be explored in the context of all Community Trusts in England and Wales.

2. To determine the extent of the organisational impact that has resulted from the development, implementation and use of a CIS in Community Trusts in England and Wales. The literature review and exploratory research identified the most likely areas of organisational impact following a CIS implementation and it was envisaged that the results from the survey would confirm whether similar levels of impact were also being experienced in other Trusts. Furthermore, it was envisaged that the relationship between the level of organisational impact experienced and the perceived level of success associated with the CIS could also be explored in the context of all Community Trusts in England and Wales.

3. To derive a measure of the perceived success for each responding Trust's CIS. It was envisaged that by studying the perceived performance of each Trust's CIS it would be possible to explore the relationships that may exist between best practice, organisational impact and success. Furthermore, it was also envisaged that the success score would provide a basis for targeting Trusts that experienced varying degrees of success for the third stage of the research project.

4. To determine the uptake and application of community information systems in Community Trusts in England and Wales. The lack of prior research in this area meant that there was little up to date information regarding the number of Trusts using a CIS, whether the systems being chosen were similar to the type adopted at Central Nottinghamshire Healthcare (NHS) Trust in terms of their

functionality and whether the Trusts had set similar objectives for their systems. It was envisaged that this approach would enable the potential effect of these confounding factors to be assessed when examining possible relationships between either best practice, organisational impact or success. A section in the questionnaire was specifically devoted to recording contextual information about the different CISs in use and also provided the basis for identifying suitable Trusts for further examination in the third stage of the research project.

It was envisaged that through the exploration of these issues it would be possible to develop: an overview of the different experiences of Community Trusts with regard to community information systems; confirm the applicability of the research variables and framework to the wider population of Community Trusts in England and Wales; and facilitate a stronger basis from which to generalise findings from the third stage of the research project to a wider population.

5.3 METHODOLOGY

The decision to employ a survey approach for this stage of the research is reviewed in the context of alternative research strategies in chapter three. Consequently, the following sections are primarily concerned with the development and execution of the survey. Details are provided on the structure and content of the questionnaire, the targeting of respondents and the methods adopted for pre-testing and piloting.

5.3.1 Structure and Content of Questionnaire

There have been two surveys undertaken by the NHS Executive studying the uptake and application of community information systems in England and Wales. The first study (Department of Health, 1995) involved a questionnaire sent to all Community Trusts in England and Wales in 1995. The second survey (Department of Health, 1996) was conducted a year later and targeted the suppliers of the technical systems rather than Community Trusts. Although both surveys provided some useful information they had a number of drawbacks.

The first survey had concentrated on assessing the systems Trusts would like to have

in the future rather than what they expected to achieve with limited resources. Consequently, the majority of the data collected by this survey recorded desired, rather than actual levels of CIS use and functionality. In addition, the first survey was already at least two years out of date and reflected the priorities of the NHS Executive at that time that have since been revised.

The value of the second survey was also limited because it only concentrated on the functionality of the systems and the information the suppliers considered their systems were capable of producing in Community Trusts. However, system suppliers have a vested interest in their systems appearing successful and the reality of system functionality at Community Trusts could be quite different to the suppliers' perception. This view was supported by the experience of Central Nottinghamshire Healthcare (NHS) Trust, whose system when tested and piloted fell some way short of the functionality that the supplier had originally promised. Furthermore, both surveys lacked detailed information on the approaches used to implement the systems, the organisational issues encountered or any measure of the success achieved so far. There was also no information about the individuals who had completed the questionnaires or the organisations that they worked for.

Consequently, as there was no satisfactory alternative source of information about the uptake and application of community information systems, it was considered necessary to conduct a survey of all Community Trusts in England and Wales. The survey was to be confined to these countries because Scotland and Northern Ireland operate under a different approach and organisation to the delivery of community healthcare that makes comparisons difficult. A draft questionnaire was developed that was based upon issues identified from the literature and issues highlighted from the exploratory research phase of the project reported in chapter four. A full copy of the questionnaire and cover letter used in the survey is presented in **Appendix 2**. The questionnaire was broken down into seven main sections that are briefly reviewed below.

Section 1: Background Information

The questionnaire opened with several introductory questions designed to develop a

brief profile of the respondent's Trust. The questions recorded information about: the services the Trust provided; whether the Trust had a CIS or intended to purchase or develop one in the near future; the level of CIS implementation if appropriate; and details of the CIS and supplier that the Trust had, or was intending to adopt. Finally, if the respondent indicated that they had no intention to purchase or develop a CIS in the near future an explanation for this decision was requested.

Section 2: Drivers Behind Purchasing an Information System

The second section attempted to identify the key drivers that had motivated Trusts to implement a CIS. A pre-defined list of nine potential explicit objectives were presented in the questionnaire developed from the Generic Summary of Need for a Community Health Information System (NHS Information Management Group, 1994), Community Information Systems for Providers Business Case Guidance (NHS Information Management Group, 1993) and Central Nottinghamshire Healthcare Trusts own business case for the procurement of a CIS (Central Nottinghamshire Healthcare (NHS) Trust, 1994). The respondents were requested to indicate the statements that had been set as explicit objectives for their CIS and also to rank these objectives in order of importance. Respondents were also provided with space to include additional objectives that may have been set for their Trusts' CIS.

Section 3: Implementation of the System

This section was concerned with measuring the extent that Community Trusts had adopted various elements of best practice and which elements they considered to be most important. The statements covered a range of areas including: senior management commitment; user involvement; testing of the system; user training; user support; and positive user attitudes. In addition, a statement was also included to address the level of resources devoted to CIS implementations as this was found to be an important element of senior management commitment during the exploratory research. Similarly, two statements were included to address different aspects of user training: the breadth of the training in terms of wider issues associated with the CIS and whether the training accounted for variations in user skill levels. Both these aspects of user training were also identified as being important at the exploratory case study (Central Nottinghamshire Healthcare (NHS) Trust). The statements were

primarily derived from the literature review and exploratory research presented in chapters two and four. The statements were operationalised by asking respondents to indicate the extent to which they agreed or disagreed with a statement on a scale of 1-5 where 1 was strongly disagree and 5 was strongly agree.

Section 4: Functionality of the System

This section was intended to provide a brief profile of the key areas of functionality associated with respondents' CISs. Respondents were asked how many staff were using the CIS and how much they expected that number to increase over the following two years. This was done in order to gauge the level of implementation and possible further development of the system. Respondents were also asked whether the system used portable technology, which staff groups entered data onto the system, the level of integration between professional groups that the system supported and the timeliness of the system updates. More specifically respondents were asked about the staff groups currently using the system and those that were expected to be using the system in the future. It was envisaged that the data recorded in this section would identify Trusts that had similar compositions, in terms of staff groups and system functionality, but were experiencing different levels of success. These Trusts could then be targeted for the final stage of the research project.

Section 5: The System's Impact on the Organisation

The fifth section of the questionnaire investigated the degree of impact that the CIS had engendered on the respondent's Trust. The statements included in this section were derived from the literature review and exploratory research presented in chapters two and four respectively. The areas of organisational impact that were addressed in this section included changes in: clinical and non-clinical working practices; the flow of information; user empowerment; organisational culture; organisational processes; organisational structure; and user ownership. The exploratory research provided a key insight with regard to the working practices variable. The findings indicated that the variable should be divided between changes in clinical and non-clinical working practices. It was suggested by informants that changes in clinical working practices could be particularly significant in determining the success of a CIS as they were likely to result in improvements to the delivery of patient care. By contrast, changes

in non-clinical working practices, although important, were considered to be less influential to system success as these aspects of work were generally given a lower priority by staff. As in the case of section 3, the questions were all operationalised using a 5 point Likert scale. In addition, a further question was included to assess the reduction in paperwork associated with the implementation of a CIS. This question was included at the request of the sponsors, (Central Nottinghamshire Healthcare NHS Trust) for their own information, but also provided an additional measure of the organisational impact of a CIS.

Section 6: Performance of the System

The sixth section of the questionnaire was designed to evaluate system effectiveness and was based upon a range of distinct, yet complementary, measures. This section consisted of ten performance measures, that were strongly influenced by the taxonomy of generic success measures developed by DeLone and McLean (1992). The section addressed issues such as 'system accuracy / reliability', 'information quality', 'individual impact', 'organisational impact'[7], 'user satisfaction', and 'end-user system utilisation'. In addition, a further four questions were developed to specifically address the performance of a CIS and were strongly influenced by the overall aims set for community information systems by the NHS Information Management Group (NHS Information Management Group, 1993) and the sponsors' desire for benchmark information with which to compare their own experiences. These questions addressed whether: professional staff were using the CIS to retrieve information; the CIS had facilitated improvements in direct patient care; the CIS had facilitated improvements in users' job performance; and whether the CIS had enabled clinical staff to be used more efficiently in direct patient care. It has been recognised that the DeLone and McLean (1992) success categories, although useful, may be incomplete (Seddon and Kiew, 1994). Consequently, the opportunity to develop additional measures of success, specific to the research context, is considered to

[7]It should be noted that the use of the term organisational impact by DeLone and McLean (1992) differs from the definition of organisational impact adopted for this study. DeLone and McLean (1992) only refer to organisational impact in terms of the effect of the information system on the performance of the host organisation, whereas this study considers organisational impact to refer to changes in structure, management and ultimately the way an organisation conducts its business.

further enhance the CIS performance measure used in the survey. As in the case of sections 3 and 5, the questions were all operationalised using a 5 point Likert scale.

Section 7: Other Comments

The final section was completely unstructured and respondents were encouraged to make additional comments regarding community information systems that they felt were relevant to the research. Final instructions were provided for returning the completed questionnaire and respondents were thanked for their efforts.

5.3.2 Choice of Respondent

In considering the appropriate person to target with the questionnaire, the researcher's decision was governed by several constraints. Due to cost implications only one questionnaire was to be sent to each Trust and it was considered important to ensure that the questionnaire was sent to a named addressee as this has been shown to increase the likelihood of a high response rate (Dillman, 1978). Further constraints included: whether it was possible to ascertain the respondents name; whether they would have sufficient knowledge to answer all the questions included in the questionnaire accurately, without having to make undue effort; and whether they would be interested in the research and therefore likely to return the questionnaire (Newell, 1993). However, despite these constraints the choice of respondent still presented the researcher with several options, each of which is briefly reviewed below.

The first option was to send the questionnaire to a clinical user of the system in each Trust. Existing research has shown that measures at the individual level, focusing on users' perception of the system, have been the most popular methods to study MIS success (Bailey and Pearson, 1983; Ives et al., 1983; Ives and Olson, 1984; Davis et al., 1989; Allingham and O'Connor, 1992). Therefore this approach had the advantage of recording the views of an individual whose opinion of the CIS is considered crucial in determining whether an information system is perceived as a success or not. However, there were several practical difficulties in attempting to target an individual user of a CIS in a Trust. There was no obvious source of names and addresses for users of a CIS in each Trust and there was a high possibility that the

user would not be in a position to give an overall perspective of their Trust's experience of using a CIS. In addition, the content of the questionnaire was considered to require knowledge that a clinical user of the system may not have, such as the drivers for purchasing or the functionality of the system. Consequently, this approach was dismissed.

The second option was to target the questionnaire at a member of the Trust's middle management. There were two possible target groups for this approach; clinical managers or administrators. Having studied the experience of implementing a CIS at Central Nottinghamshire Healthcare (NHS) Trust it was clear that not all clinical managers and administrators would have been involved in a Trust's CIS development project. Consequently, it would be practically impossible to ensure that the questionnaire targeted a respondent with adequate knowledge to complete the questionnaire. These groups also had limited information in terms of potential named addressees and consequently were not considered sufficiently reliable to generate a high response rate.

The third option was to target the questionnaire at a member of senior management. It was considered likely that certain key members of senior management would have been involved with the decision to implement a CIS, such as, the Director of Finance, Director of Corporate Affairs, Director of Nursing or Patient Services and the Chief Executive. In addition, the names and addresses of these individuals were also readily accessible from the annually published NHS Yearbook. However, the non-clinical members of senior management, such as a the Director of Finance, although having greater involvement with the system at a policy level, may have less knowledge of the detail of the system and practical day to day issues that the clinical managers and users may be facing. Furthermore, the clinical senior managers may well have a polarised perspective on their professional discipline, being well placed to comment for example, on the perceptions of Nurses regarding the CIS, but in a less strong position to comment on the perceptions of other health care professionals. Consequently, this group of potential respondents was also dismissed.

The final option was to target the IM&T Managers in each Trust. These managers

would clearly have been heavily involved in the CIS and would be in the best position to be able to complete the full content of the questionnaire. It was considered likely that they would have had a good understanding of the experiences of different staff groups in using the system and would have an overall perspective of these experiences across the Trust. In addition, the vast majority of Community Trusts identified a named manager in this role allowing the questionnaires to be targeted at specific individuals. An additional advantage of targeting IM&T Managers was that they were the most likely group to be interested in the research and the research results so that may encourage a higher response rate.

However, it was also noted that there would be drawbacks to targeting these managers largely in terms of possible biased responses. It was thought possible that the respondent, being largely responsible for the implementation of the CIS, may wish to show that the implementation was conducted in line with 'best practice' and that the system is performing well, whether this is a true representation of the Trust's experiences or not. The likelihood of generating a socially desirable response (Oppenheim, 1992) is a drawback to this approach. However, despite these limitations, the IM&T Managers were still considered to be the most practical group of potential respondents to target.

Consequently, the questionnaire was sent to all named IM&T Managers in Community Trusts in England and Wales. In those Trusts that did not identify an IM&T Manager in the NHS Yearbook, the questionnaire was sent to the Chief Executive of that Trust. It was assumed that the Chief Executive would either forward the questionnaire to whoever they considered most appropriate or alternatively complete the questionnaire if they felt that they had sufficient knowledge.

As well as targeting the respondents most likely to have the knowledge and interest to complete the questionnaire, several additional tactics were employed to improve the overall response rate. Studies have shown that the number and quality of responses are positively correlated with the format and layout of the questionnaire (Berdie, et al., 1986). Consequently, the questionnaire was limited to a five page layout, so as not to appear lengthy and time consuming to complete, and the front page emphasised the

assurance of confidentiality for respondents. Each questionnaire was individually printed rather than photocopied (Churchill, 1988) on A4 yellow paper to allow questions to be well spaced and clearly printed, as well as making the document 'stand out' from other paperwork (Newell, 1993). A freepost envelope was also included with each questionnaire and an attempt was made to establish trust between the researcher and the respondent by providing a token of appreciation (Dillman, 1978). In this research, a summary of the research findings would be provided to interested Trusts.

5.3.3 Distribution of Questionnaire

As well as choosing the most appropriate potential respondent for the questionnaire there were also some difficulties in developing a survey database of all Community Trusts in England and Wales. Since the introduction of NHS Trusts in 1991 these organisations have been allowed to rename themselves to develop a more corporate profile. Consequently, organisations that used to have their geographical location and indication of their service provision in their title no longer needed to include these elements. For example, Cambridge Community Health Services Unit became Lifespan Healthcare NHS Trust. This renaming meant that it was more difficult to confirm those Trusts that should be included in the survey and those Trusts that may be providing acute services only and therefore should be excluded. In addition, Community Trusts may provide additional services such as Acute, Mental Health or Learning Disability services and some Trusts concentrate on these services while still providing a small amount of community services. Since a CIS could be in use at all of these Trusts it was considered necessary to include Mental Health and Learning Disability Trusts in the main database and only try and exclude those Trusts that were clearly not providing Community services. By taking this selection strategy the researcher was confident that all Community Trusts were incorporated in the sampling frame.

Details of the NHS Trusts were compiled from the 1995/96 and 1997/98 NHS Yearbooks (NHS, 1995; NHS, 1997) whilst additional information was provided by the NHS Information Management Group. The final version of the database had 236 potential respondents and that was considered to be the total population of

Community, Mental Health and Learning Disability Trusts in England and Wales.

5.3.4 Pretesting of Questionnaire

Adequate pretesting of a questionnaire is particularly important as it is the stage in the development of the questionnaire that determines how effective the survey instrument will be (Reynolds et al., 1993). It is the process by which the questionnaire design is refined and errors identified and is a vital step in questionnaire development in order to avoid mistakes in the final document (Hague, 1987). Churchill (1988) states that, *'Data collection should never begin without an adequate pretest of the questionnaire'*. The importance of pretesting is widely recognised in the literature and the most popular method utilises a personal interview approach (Kinnear and Taylor, 1987; Peterson, 1988; Boyd et al., 1989).

The personal interview allows the researcher to study the respondent as they complete the questionnaire and gauge their reactions to different questions. There are two approaches to determining respondents' reactions to the questionnaire. The first approach involves the respondent being encouraged to 'think out loud' as they complete the questionnaire and is called the protocol method. The second approach, the de-briefing method, involves the respondent completing the entire questionnaire and then discussing the various sections in detail with the researcher. Although both methods are considered effective, the protocol method provides a greater volume of information for the researcher (Reynolds et al., 1993).

The literature also recommends that the questionnaire should be piloted on a sample of respondents that are either a subgroup of the main sample population or are as similar as possible to the final group (Hunt et al., 1982; Green, et al., 1988). The main purpose of the pilot study is to test the effectiveness of the survey instrument in the actual research environment and assess the value of the data recorded through the statistical techniques to be adopted in the final analysis (Churchill, 1991; Newell, 1993). In addition, the pilot can uncover problems, unique to the mode of administration (Churchill, 1988).

The pretesting adopted for the questionnaire used in this research covered several of

the areas discussed above. The first round of pretesting involved the draft questionnaire being shown to several academics in the Business School in order to test for technical errors in the design (Hague, 1987; Green et al., 1988) The draft was also sent to contacts that had been made within the NHS Information Management Group for general comments and was passed to several staff at Central Nottinghamshire Healthcare (NHS) Trust including the IM&T Manager. It was possible to conduct the pretesting by means of individual discussions with academic staff at the Business School and a personal interview using the protocol method with staff at Central Nottinghamshire Healthcare (NHS) Trust. Furthermore, with the aid of a covering letter from the Organisational Development Advisor at Central Nottinghamshire Healthcare (NHS) Trust, a draft of the questionnaire and cover letter was sent to five IM&T Managers at separate Community Trusts. All the IM&T Managers returned the drafts with annotated comments and a covering letter and where necessary, subsequent phone calls were made to the managers to clarify any ambiguous remarks.

On the whole the pretesters were happy with the draft questionnaire although some interesting enhancements were suggested in both the wording and the design of the questionnaire. For example, one IM&T Manager suggested that both the cover letter and the questionnaire needed a *'snappy way of capturing readers interest and the relevance of the survey to them'* which led to the title of the research changing from 'The Use of Community Information Systems in Healthcare' to 'Ensuring a Successful Community Information System.' Other comments included, making the section headings large and bold as they were thought to help respondent's thinking when answering the questions, reducing the amount of text in the covering letter and making the aim of the research clear. Positive comments were made about the use of colour and shading in the questionnaire and the general content and wording of the majority of the questions.

Following this round of pretesting, the questionnaire went through several revisions each assessed by academics within the Business School and staff at Central Nottinghamshire Healthcare (NHS) Trust, until a final draft was produced. This final draft of the questionnaire was then piloted on a 10% sample of the main survey

population (Newell, 1993). The questionnaires were sent out in precisely the same format as was envisaged for the main survey. Twenty questionnaires were sent out and 12 were returned giving a very encouraging response rate of 60%. The subsequent analysis of the responses indicated no problems with the content or structure of the questionnaire and no further alterations were made.

5.4 ANALYSIS AND RESULTS

The following sections provide a discussion of the analysis that was conducted of the survey responses and the findings that emerged. The discussion is broken down into seven sections that broadly follow the structure of the questionnaire.

5.4.1 Response Rate

A total of 236 questionnaires were sent out and 92 responses were initially received, prompting the decision to send a follow up questionnaire, four weeks after the first wave. A further 44 responses were received and including the pilot these additions brought the total number of responses to 136 giving a very high[8] response rate of 58%. Although the survey guaranteed confidentiality, respondents were offered the opportunity to receive a copy of the results if they were interested. It was encouraging that over 80% of the respondents requested a copy of the results, giving some indication of the high interest in this topic within the community health sector.

A 10% sample was selected from the non-respondents and they were contacted to explore the possibility of non-response bias (Moser and Kalton, 1971: p182). Of the ten non-respondents, three worked in Trusts that did not provide any community services; two received letters that were addressed to individuals that no longer worked at the Trust and were being forwarded; two stated that their Trust did not have a CIS or intended to purchase one in the near future and consequently did not feel the survey applied to them; and three stated that they had been too busy to reply. The latter five respondents were all encouraged to return their questionnaires but only one additional document was eventually returned, too late to be included in the survey

[8]Dillman (1978) states that the average response to a mail based questionnaire is usually 24%, rising to 42% after a follow up has been conducted.

analysis. Although it was disappointing to note that some respondents had not considered the questionnaire worth completing, this response was expected. More positively, although these results cannot prove an absence of bias, they suggest that no particular groups were excluding themselves from the survey.

In addition, the responding Trusts were examined for differences in terms of whether they had a CIS or not and to what extent it had been implemented (Moser and Kalton, 1971: p268). The composition of the responding Trusts included 35 that had not yet purchased a CIS and of the Trusts that had bought or developed a CIS, 48 had partially implemented a CIS and 34 had fully implemented their system. These results, coupled with the response rate of 58%, suggest that the respondents to the survey were not biased towards any particular group in terms of whether they have a CIS, or the degree to which it is implemented, which increases confidence in the data quality of the survey.

5.4.2 Respondent Profile

Of the 136 respondents 117 stated that their Trust provided community services and only these respondents' questionnaires have been included in the analysis. Of the 117 respondents, 82 had bought or developed a CIS; 48 had partially implemented their system and 34 had fully implemented their system. Of the remaining 35 respondents that stated they had not bought or developed a CIS, only 5 stated that their Trust had no intention to purchase a CIS within the next two years.

When it came to the acquisition of CISs the vast majority of Trusts have opted to purchase a system. In total, 29 different system packages were recorded from the respondents. Table 5.1 shows the most common systems in use: the most popular being the Comwise system from Systems Team (Central Nottinghamshire Healthcare (NHS) Trust being one of the users); PIMS from KPMG; Swiftcare from EDS; and PHC from Protechnic. Only eight Trusts that responded to the survey had developed their own system in-house.

Table 5:1 Types of Information Systems Used by Community (NHS) Trusts

Name of System	Supplier	Number partially implemented	Number fully implemented	Number of Trusts using the system
Comwise	Systems Team	8	10	18
Other	Other	8	1	9
PIMS	KPMG	7	1	8
Swiftcare	EDS	5	3	8
Various	in-house	6	2	8
PHC	Protechnic	6	1	7
Comway	Systems Team	2	4	6
Comcare	Siemens-Nixdorf	0	6	6
Totalcare	AT&T	2	4	6
Continuum	Peak Systems	3	0	3
RICHS	HBO	1	1	2
ACT Medysis	ACT	0	1	1
Totals		48	34	82

5.4.3 Drivers Behind Purchasing a CIS

The survey identified nine distinct aims that may have influenced a Trust's decision in deciding whether to adopt a CIS. Each respondent was asked to specify which aims were set as explicit objectives for their CIS or the explicit aims that would be set for their CIS when it was developed. The respondents were then asked to rank the explicit aims for their CIS in the order that they perceived them to be most important. Table 5.2 presents the results of this ranking. In order to compare the overall ranking of the aims a weighted average rank (WAR)[9] was computed for each aim (Hult et al., 1997). A low WAR value indicates a high level of perceived importance associated with that aim and vice versa. It should be noted that the WAR was computed using ordinal data and while this means that a WAR of 2.0 is better that a WAR of 4.0, it is not necessarily twice as good.

[9]Details of calculating the WAR are provided with Table 5.2

Table 5:2 Aims set for Community Information Systems Within Trusts

Aim	Frequency (N = 117)	WAR	Number of Times the Aim was Ranked								
			1	2	3	4	5	6	7	8	9
Enabling staff to monitor clinical activity in order to improve their clinical effectiveness	89	2.66	34	17	17	10	1	2	5	1	2
Fulfilling the information requirements of Health Commissioners and GPs	97	3.30	15	18	17	13	20	8	4	1	1
Providing data needed for management purposes from data generated from the care delivery process	98	3.58	16	13	15	14	14	6	6	4	0
Sharing information between different professional groups	86	4.38	10	13	13	12	12	2	12	10	2
Providing an longitudinal electronic record for patients	82	4.38	15	10	11	9	4	13	8	7	5
Incorporating security systems to protect patient confidentiality	84	4.52	14	4	9	13	15	11	8	8	2
Providing the NHS Community Minimum Data Sets	95	5.23	10	7	7	13	11	10	17	14	6
Developing a system that is capable of linking to other systems external to the Trust	75	5.36	3	9	6	11	7	10	13	11	5
Producing cash releasing cost improvements	46	6.33	3	2	4	4	3	5	5	4	16

Note: The Weighted Average Rank (WAR) is calculated by multiplying the rank by the number of responses, that are then summated and divided by the number of respondents identifying it as an explicit aim (Hult et al., 1997).

Table 5.2 indicates that the aim that is perceived to be of most importance in influencing the uptake and application of CISs is enabling staff to monitor clinical activity in order to improve their clinical effectiveness. The second most important objective identified by respondents was fulfilling the information requirements of Health Commissioners and GPs. The third most important objective was providing data needed for management purposes, from data generated by the care delivery process. The objectives that were least important were producing cash releasing cost improvements, developing a system that is capable of linking to other systems external to the Trust and providing the community MDS. Incorporating security systems to protect patient confidentiality was also given a low ranking on average. It is interesting to note that it is now the information needs of both clinical and non-clinical staff within Trusts and local agencies that are being given a high priority and not the centrally required data sets.

5.4.4 Implementation of the System

Table 5.3 presents a summary of the responses concerning the adoption of best practice in Community Trusts. The table shows that senior management commitment and user involvement have both seen reasonably high levels of adoption and there has also been attention given to both user training and support by IM&T Managers when implementing a CIS. It is also interesting to note that generally resource provision is considered to be insufficient although this result must be considered in the light of the fact that IM&T Managers were responding to the survey. Had the survey been targeted at Finance Directors rather than IM&T Managers, the result may have been more positive.

Table 5:3 Summary of Responses Regarding Adoption of Best Practice

Statement	Average Response
The project has active support from top management	4.12
The users were actively encouraged to participate in the specification of the Trust's requirements in the development of the CIS	4.12
Extensive support and help was available to staff using the CIS during implementation	3.90
The training programme allowed for variations in the skill of the user population	3.79
Users' attitudes towards the CIS have been changing positively during the development and implementation of the CIS	3.54
A broad training programme exists, designed to address wider issues, as well as teaching staff how to use the CIS	3.50
The CIS was extensively tested by the Trust before it was fully implemented	3.15
Enough resources have been allocated to the development and implementation of the CIS	2.37

Note: Average response is based on a 5 point Likert scale where 5 is strongly agree and 1 is strongly disagree.

5.4.5 System Functionality

In terms of the functionality of systems, 48% of the respondents stated that their CIS used portable technology to support the practitioner in the field. This result suggests that changes in clinical working practices may have been taking place within Trusts with information technology (IT) playing a more significant role during contact between healthcare professionals and patients. Furthermore, 74% of respondents stated that information could be shared between different professional groups within the Trust using the CIS. This sharing of information may also influence clinical working practices and improve the opportunities to provide holistic healthcare to patients.

5.4.6 The Organisational Impact of the System

A summary of the level of organisational impact perceived by respondents is provided in Table 5.4. These results are clustered around the average 3 with the negatively worded statement concerning improvements in the flow of information showing the most positive impact of a CIS, viewed across all the respondents. The results also indicate that there have been some changes in non-clinical working practices, level of user empowerment and level of user ownership but that these changes have not been

dramatic across all the Trusts. Changes in organisational structure appear to be an area that has experienced least impact with changes in organisational processes also showing little change. The results confirm that Community Trusts have been experiencing some degree of organisational impact engendered by the implementation and use of a CIS and that the role of organisational impact in systems development is worth studying in more depth in the community healthcare sector.

Table 5:4 Summary of Responses Regarding Organisational Impact

Statement	Average Response
The CIS evoked large changes in users' non-clinical working practices in our Trust.	3.50
The CIS has empowered users by giving greater accessibility to information in our Trust.	3.36
The users are accepting ownership of the CIS.	3.33
Clinical staff still keep paper based records to the same extent that they did prior to the CIS.	3.11
The CIS has had a big impact on the culture of the user groups, where organisational culture is defined as 'The set of assumptions, beliefs and values, often unstated, that members of an organisation share in common.'	3.10
The CIS evoked large changes in users' clinical working practices in our Trust.	2.87
The Trust is having to make large changes in its organisational processes to fit with the CIS.	2.60
The CIS has ***not*** improved the existing flow of information in our Trust.	2.18
The CIS has caused large changes in the organisational structure of the Trust.	2.11

Note: Average response is based on a 5 point Likert scale where 5 is strongly agree and 1 is strongly disagree.

5.4.7 The Performance of the System

A summary of the scores for each of the ten success measures is presented in Table 5.5. These results suggest that the performance of community information systems has, to date, been modest with all the average success scores clustered around the midpoint of three on the Likert scales. However, it is interesting to note that whilst the impact of CIS on direct patient care is perceived to have been limited, its positive contribution to managerial decision-making is readily acknowledged.

In addressing the four research objectives identified at the end of section 5.2 of this

chapter, it was necessary to generate an overall success score for each responding Trust. This overall success score was derived by averaging the ten individual success measures. It was only possible, therefore, to generate overall success scores for

Table 5:5 Summary of Success Measures and Scores

Success Measure	Average Success Score
The reports produced by the CIS have been valuable aids to the decision-making of managers	3.58
The CIS is considered to be a technological success in terms of accuracy and reliability	3.43
The reports produced by the CIS have been relevant, informative and useful to professional clinical staff	3.40
The new information provided by the CIS has led to changes in decisions, or new decisions by staff	3.01
Professional staff use the CIS regularly to retrieve information, rather than simply inputting data	2.93
The CIS has allowed clinical staff to be used more efficiently in direct patient care	2.81
Staff like using CIS	2.80
Staff are satisfied with the CIS	2.76
The CIS has improved overall job performance	2.60
The CIS has enabled practitioners to spend more time providing direct patient care	2.40

Note: Average Success Score is based on a 5 point Likert scale where 5 is strongly agree and 1 is strongly disagree.

respondents who had provided all ten measures; a total of 75 cases met this criterion and were included in the following analysis. Before generating the success score it was also necessary to confirm that all the statements in the performance section of the questionnaire were measuring the same factor, namely success. This confirmation was achieved by using factor analysis, the results of which showed that only one factor could be extracted and that none of the ten statements had a factor loading[10] of less than 0.75. Furthermore, internal reliability tests produced a very strong Cronbach alpha value of 0.94. Both the factor analysis and internal reliability tests indicated that it would be acceptable to use a summated score to measure success (Hair et al., 1995: p390-400). The remainder of this chapter uses the summary success score to explicitly

[10]Hair et al. (1995: p385) suggest that factor loadings greater than 0.65 can be considered as significant with a sample size of 70.

explore the relationships between best practice and success, organisational impact and success and user ownership and user attitudes and success.

5.4.8 The Adoption of Best Practice and the Resultant Level of Success

The relationship between each best practice factor and the overall success measure was explored by generating a series of correlation coefficients, utilising 2-tailed tests; the results are presented in Table 5.6. These results indicate several of the best practice factors have a relationship with the success score that is statistically significant at the 0.01 level. The highest of the coefficients was positive user attitudes and success. This coefficient was considerably higher than any of the other best practice variables and suggests that the development of positive user attitudes is very closely related to CIS success. The reasons for this variable being out of line with the other best practice variables are discussed in section 5.4.9.

Table 5:6 Correlation Coefficients Between Best Practice and Success Score

Statement	Correlation with Success Score
Users' attitudes towards the CIS have been changing positively during the development and implementation of the CIS.	.6658**
The CIS was extensively tested by the Trust before it was fully implemented	.4664**
Extensive support and help was available to staff using the CIS during implementation	.3619**
The users were actively encouraged to participate in the specification of the Trust's requirements in the development of the CIS	.3165**
The project has active support from top management	.3157**
A broad training programme exists, designed to address wider issues, as well as teaching staff how to use the CIS	.2612*
The training programme allowed for variations in the skill of the user population	.2601*
Enough resources have been allocated to the development and implementation of the CIS	.2079

Notes: * - Significant at the 0.05 level; ** - Significant at the 0.01 level (2-tailed)

Of the remaining best practice variables, the highest coefficient was for extensive testing of the system and success. The importance of testing is recognised as a best practice factor by the NHS (National Audit Office, 1996) as well as the general IS literature (Ennals, 1995; Flowers, 1997) and therefore its significant score in this

analysis supports existing theory.

Other key areas that also have significant correlations with success, at the 0.01% level, are providing support and help for staff during implementation, ensuring adequate user involvement and maintaining support for the project from top management. Further evidence of the importance of these factors was provided by the number of respondents who chose to make reference to them in the '*other comments'* section of the questionnaire. For example, a representative selection of respondents' comments included*: 'the inclusion of clinicians and IT specialists in a cohesive team has been invaluable'*; *'successful implementation relies totally on user involvement and senior management commitment throughout the project'*, and *'training and support are key to a successful implementation'*. These results confirm the findings of previous studies and reports (Cerullo, 1980; Miller and Doyle, 1987; Whyte and Bytheway, 1996; National Audit Office, 1996; Audit Commission, 1997) as they suggest that those Trusts that deploy appropriate support and secure high levels of user participation and senior management commitment are likely to achieve higher levels of system's success.

The two correlations that are significant at the 0.05% level both concern different aspects of training, namely the importance of designing broad training programmes and the need to allow for variations in the skill of users. These findings support previous studies that have indicated the importance of training in the successful introduction of information systems (Miller and Doyle, 1987; Whyte and Bytheway, 1996).

It should be noted that while all these significant correlations do not indicate causality, they do provide evidence that these are positive steps that have been adopted in the development and implementation of successful community information systems. They also provide evidence that the best practice factors associated with the successful introduction of information technology within Community Trusts are consistent with existing information systems theory.

5.4.9 The System's Organisational Impact and the Resultant Level of Success

The same correlation analysis approach used in the previous section was also used to study the relationship between system success and organisational impact. The results presented in Table 5.7 provide evidence to support the view that the level of organisational impact that an information system has within a Trust is associated with the success of the system. More specifically, three positive correlations and two negative correlations were found to be statistically significant at the 0.01 level.

Table 5:7 Correlation Coefficients for Organisational Impact and Success Score

Statement	Correlation with Success Score
The CIS has empowered users by giving greater accessibility to information in our Trust.	.6565**
The CIS has had a big impact on the culture of the user groups, where organisational culture is defined as 'The set of assumptions, beliefs and values, often unstated, that members of an organisation share in common.'	.6303**
The users are accepting ownership of the CIS	.6251**
The CIS evoked large changes in users' clinical working practices in our Trust.	.2963*
The CIS has caused large changes in the organisational structure of the Trust.	.1051
The CIS evoked large changes in users' non-clinical working practices in our Trust.	-.0751
The Trust is having to make large changes in its organisational processes to fit with the CIS.	-.1752
The CIS has **not** improved the existing flow of information in our Trust.	-.3777**
Clinical staff still keep paper based records to the same extent that they did prior to the CIS.	-.5576**

Notes: * - Significant at the 0.05 level; ** - Significant at the 0.01 level (2-tailed)

Positive correlations were identified for the system empowering the users and for the system modifying the organisational culture. The importance of empowerment was also highlighted in the initial exploratory stage of the research where one of the interviewees commented that: *'the only way to ensure that the planned benefits are ultimately realised is through the empowerment of users'*. These findings, which support the work of Walton (1989), demonstrate the importance of explicitly considering these issues during the development and implementation process to

ensure that the cultural and behavioural impacts of an information system are at least acceptable, if not positive.

In addition, the occurrence of user ownership also appears to be strongly associated with CIS success. This finding supports the view of Van Alstyne et al., (1995), that user ownership has a significant bearing on the ultimate success of an information system and suggests that it should be explicitly treated during the systems development project. The importance of user ownership and its relationship with system success is further discussed in section 5.4.9.

The positive relationship between clinical working practices and success, at the 0.05% level, is also interesting as it suggests that the impact of Community Information Systems is being felt outside the realms of management and administration. This finding provides some evidence that those Trusts that have heeded the Audit Commission's (1997) call for CIS to be *'patient-based to support clinical decision-making'* perceive their systems to be successful.

In terms of the significant negative correlations between the statements and success, the first can be viewed as a positive correlation as the statement itself is negative. The statement that the CIS has ***not*** improved the flow of information within the Trust has a negative correlation of -0.3777 that implies that there is a positive association between the CIS improving the flow of information within the Trust and the perceived success of the system. The only true negative correlation is between staff still keeping paper records to the same extent that they did prior to the CIS and the success score. The significant negative correlation of -0.5576 indicates that there is an expectation that the CIS should reduce the amount of paperwork that staff have to deal with if it is to be viewed as a success. If this does not occur then a duplication of work is likely to continue that will lead to dissatisfaction with the system from staff.

Previous research (Pliskin et al., 1993; Cooper, 1994) has indicated that IT-induced organisational change can result in user resistance and ultimately system rejection. By contrast, these findings tend to support Venkatraman's (1991) proposition that there is a positive relationship between organisational impact and a system's success. Indeed,

it can be argued that those Trusts that adopt a more proactive approach to organisational change and look to develop opportunities rather than attempting to maintain the status quo that existed before the information system, are more likely to have a successful system. The lack of any significant correlation between changes in non-clinical working practices, organisational structure and processes, and success, however, suggests that these changes are likely to be more subtle in the way staff conduct their day-to-day activities rather than revolutionising their current working practices.

5.4.10 The Occurrence of User Ownership, Positive User Attitudes and the Resultant Level of Success

The correlation analysis provided interesting results with regard to user attitudes and user ownership. Tables 5.6 and 5.7 have shown that both user ownership and positive user attitudes had some of the strongest overall correlations with the success score, significant at the 0.01% level. These findings confirm that both these variables are considered relevant to the success of a CIS by IM&T managers in the Trusts that responded to the survey. They also suggest that achieving positive user attitudes and user ownership have a significant influence on the overall perceived success of a CIS. However, the strength of the correlations with success was considerably higher for both of these variables compared to the other best practice and organisational impact variables. As a result of these findings being out of line with the other variables, it was decided that the role of user attitudes and user ownership should be reviewed at this juncture.

In a recent critique of the existing literature, Clegg et al. (1997b) summarised the main areas where user attitudes were significant as being: "*attitudes towards, expectations of and aspirations for specific applications; user participation in the development of systems; the usability and functionality of systems; job demands and job characteristics associated with new systems; and user reactions to systems of IT, such as satisfaction with the system, commitment to the system, usage of the system, performance on the system, competencies in using the system and psychological well-being*" (p15-16). The comments made by Clegg et al. (1997b) suggest that user attitudes are significant throughout all stages of a development project and several

studies have found this to be the case. From the project outset user attitudes may already be coloured by prior experiences with earlier systems (Zoltan and Chapanis, 1982; Grantham and Vaske, 1985; Mueller et al., 1986; Dolan and Tziner, 1988) and may subsequently be affected during both implementation and use, according to the level of involvement (Buchanan and Boddy, 1982; Baroudi at al., 1986; Allingham and O'Connor, 1992; Hawk, 1993; Korunka et al., 1995) and changing working practices that occur (Clegg et al., 1997b). It would appear that unlike the variables included in best practice and organisational impact, user attitudes are influenced in both the development and operational stages of a system's life. Consequently, it is suggested that user attitudes should not be included as an element of best practice, but as a separate variable that needs to be considered throughout a systems development project.

In addition, the findings from both the survey and the exploratory research have suggested that user attitudes are closely related to system success. This observation has also been supported in the existing literature (Lucas, 1978; Lucas, 1981; Zmud, 1983; Joshi, 1990). Therefore, it would appear that positive user attitudes should be considered as having a significant influence over system's success. However, the precise nature of the relationship between user attitudes and system success is still unclear and requires further investigation. It was envisaged that the final stage of this study would specifically address this gap.

By contrast, the concept of user ownership has received relatively little attention in the past information system literature. The coverage that has been given to the issue of user ownership has usually been either in the context of increasing user acceptance (Robey and Farrow, 1982; Guimaraes and McKeen, 1993) or minimising user resistance (Markus, 1983) to the implementation of new information systems. However, Van Alstyne et al. (1995) have identified that user ownership does have an important role to play in systems development projects stating that *"ownership is a critical factor in the success of information systems"* and that, *"the key reason for the importance of ownership is self-interest: owners have a greater vested interest in systems success than non-owners"* (p268).

The existing literature has also identified user ownership in the context of system implementation as well as organisational impacts. For example, Markus (1983) considers ownership when reviewing MIS implementation theory and reasons for user resistance. Similarly, Robey and Farrow (1982) consider user ownership as an issue related to user acceptance during system implementation and Clegg et al. (1997a) also suggest that user ownership is closely related to the process of user involvement. Therefore, the evidence from the exploratory research and the existing literature suggests that, like user attitudes, user ownership can be influenced throughout a systems development and operational lifespan. This observation also suggests that user ownership is different to the other factors classified as organisational impacts and should, therefore, be considered as a separate issue.

Furthermore, the exploratory and survey research findings have provided evidence to suggest that user ownership is closely related to system success. Several, empirical studies have also identified user ownership as being a crucial contributory factor to systems failures (Markus, 1983; Beynon-Davies, 1995; Van Alstyne et al., 1995). Consequently, there would appear to be strong evidence to suggest that user ownership is an important issue that should be considered during all stages of the development process. However, the precise nature of the relationship between user ownership and system success is still unclear and requires further investigation. It was envisaged that the final stage of this study would specifically address this gap.

5.4.11 The Adoption of Best Practice and Organisational Impact

The third overall research objective for this study was concerned with investigating the methods by which organisational issues could be managed in order to ensure that the organisational impacts engendered by a CIS were positive. Although, it was envisaged that this objective would be thoroughly explored in the third stage of the research, the survey data presented the opportunity for some preliminary analysis. Specifically, it was possible to investigate whether there were any statistically significant associations between the organisational impact variables and the best practice variables. It was proposed that systems developers may be using some elements of best practice in managing organisational issues during the development process and the survey data provided some preliminary insight into possible

relationships between these groups of variables. In the light of the discussion provided in the previous section concerning user attitudes and user ownership, both these variables were excluded from this part of the analysis. Table 5.8 presents the most significant correlations found between best practices and organisational impact.

Table 5:8 Correlation Coefficients Between Best Practice and Organisational Impact

Best Practice Variable	Organisational Impact Variable	Correlation
User Support	User Empowerment	.422**
User Involvement	User Empowerment	.397**
Senior Management Commitment	Organisational Culture	.369**
User Involvement	Organisational Culture	.368**
User Training	Organisational Culture	.344**
User Support	Positive User Attitudes	.323**

Notes: * - Significant at the 0.05 level; ** - Significant at the 0.01 level (2-tailed)

The table shows that five correlations were found to be statistically significant at the 0.01 level. One of the stronger correlations was found to be between user involvement and user empowerment. This relationship has also been identified by Carroll (1997) who found that user involvement was an important facilitator in the development of empowerment among midwives who were using a new computer system. In addition, the correlations also suggested that senior management commitment, user involvement and user training may all be influencing the resultant changes in organisational culture. Barrett (1992) has identified that these variables can all be helpful in managing changes in organisational culture and ensuring that it has a positive impact on an information system. Finally, the correlations also indicated that user support may be associated with empowerment and positive user attitudes. Although the relationship between support and empowerment does not appear to have been identified in the literature, Nord and Nord (1992) have found that the level of user support, and the form it takes, can influence user attitudes during a systems development project.

Consequently, the survey data has provided a preliminary indication that there may be relationships between certain best practice variables and the management of

organisational impact variables. Although existing literature has supported the existence of these relationships further in-depth investigation is required to determine whether similar relationships are actually occurring in the community healthcare context. This in-depth study is provided in the final stage of the research project.

The correlation results that have been presented in tables 5.6 and 5.7 have confirmed the perceived importance of certain best practice variables, organisational impact variables, user ownership and positive user attitudes to the overall success of a CIS. In addition, the findings have also suggested that there may be relationships between certain best practice variables and the level of organisational impact. However, although these statistics suggest a strong association they do not indicate a direct causal link and therefore, the correlations can offer no indication of the precise relationship between these variables. It was envisaged that the third stage of the research would investigate whether the significant associations identified from the survey did in fact represent causal relationships and develop a deeper understanding of how these relationships may ultimately influence the success of a CIS development project.

5.5 DISCUSSION OF SURVEY FINDINGS

This chapter presents the findings of the second quantitative stage of the study and in itself should be of interest to both IT professionals within the healthcare sector, as well as the IS community in general. The results of this research are important because they are based upon an exceptionally good response rate (58%), of a survey targeted at a complete population, rather than simply a sample, namely the IT Managers of all Community Trusts within the UK.

The results show that there is a considerable range of information systems being adopted with no single supplier completely dominating the CIS market although Systems Team solutions are the most common. The primary driver of most Trusts using a CIS is to allow clinicians to improve the way they carry out their work by providing them with easier access to better information. The second most common driver for a CIS, providing data as a by product of the care delivery process, is in line with the current national IM&T strategy. Similarly, the need to share information

between different groups has been addressed by Trusts as encouraged by the IM&T policy guidelines. However, this integration was only supported within Trusts, as the systems ability to link to other systems external to Trusts was given, on average, a low priority. This low priority implies that Trusts are looking more at their local needs rather than preparing for national IM&T strategies such as the national NHS database. Similarly, the need to produce the Community MDS was given a low priority indicating that Trusts have not been developing systems primarily designed just to help with the contracting process. This seems to have been a wise approach as there are still no plans to implement a Community MDS and since the survey was completed, the decision has been taken to remove the internal market in the NHS. It was also clear that the majority of Trusts did not aim to create any cash releasing opportunities by implementing an information system.

It appears that despite the economic pressures on Community Trusts, they have still been trying to achieve the more difficult aims of improving healthcare in terms of their information systems, rather than using IT for purely cost cutting exercises or number crunching. This conclusion suggests that IT may be beginning to have a direct impact on the way that health care is managed and delivered in the community sector. If this is the case, it is important to investigate the extent that IT is modifying working practices and organisational culture and the effectiveness of these changes. It is envisaged that the third stage of this research project will address these issues.

When exploring the relationship between best practice and systems success, the research approach differed from the majority of previous studies by targeting different instances of a common type of system within a homogenous organisational sector. Therefore the confounding factors of sector and system have been reduced. The survey has identified and confirmed the key elements that comprise best practice with regards to systems development and implementation within the community sector and provides important insights to IS professionals about where they need to concentrate their efforts. Whilst these findings support the work of other information systems researchers, it is clear that many Trusts within the community sector, have as yet been unable to successfully adopt best practice.

The finding that there is a relationship between a system's organisational impact and its level of effectiveness should also be of great interest to IS practitioners in Community Trusts. It demonstrates that organisational change should be explicitly addressed during the development process and provides important insights into those areas that need to be concentrated upon if the information system is to be successful. This result also has wider interest to the IS community in general as there has been little empirical research into the relationship between organisational impact and systems' success.

The findings from this stage of the research have been published in Coombs et al. (1998a) and Coombs et al. (1999).

5.6 DEVELOPMENT OF ADDITIONAL RESEARCH OBJECTIVE

It has been identified that user attitudes and user ownership differ from both best practice and organisational impact respectively, and should therefore no longer be included in these groups. It is proposed that, unlike best practice and organisational impact, user attitudes and user ownership are influential throughout both the systems development project and operational phases of a system's life. The following sections review the research framework in the light of this new understanding of user attitudes and user ownership and propose an additional research objective regarding these variables for the final stage of the study.

5.6.1 Critique of the Relevant Literature

Van Alsyne et al. (1995: p 268) have stated that: 'ownership is critical to the success of information systems projects' with the key reason for this being 'self-interest; owners have a greater vested interest in system's success than non-owners'. However, Clegg et al. (1997) suggest that in far too many projects it is the developers rather than the users and user managers who own the system, which may have undesirable consequences for the system's performance. Unfortunately, this apparently important concept has received relatively little explicit attention in the information systems' literature. Where ownership has been addressed in studies it has typically been in the context of increasing user acceptance (Robey and Farrow, 1982; Guimaraes and McKeen, 1993) or minimising user resistance (Markus, 1983; Beynon-Davies, 1995).

Based upon this review of the literature, and the results of the exploratory stage of the research, the following working definition for user ownership has been derived:

> *'The state in which members of the user community display through their behaviour, an active responsibility for an information system'.*

To clarify this definition, it is necessary to add the two following qualifiers. Firstly, it must be stressed that whilst it is highly desirable that user ownership should be exhibited by the *whole* user community, *throughout* all stages of the system's development and operation, this may not always be the case. Secondly, it should be noted that the users may not be able to claim exclusive ownership of the system, as ownership will be shared with members of the steering committee and the development team, especially in the system's developmental stages.

In purely quantitative terms the importance of positive user attitudes has probably received more attention in the literature than user ownership. It is, for example, widely recognised that it desirable to attain positive user attitudes as this may have a beneficial impact upon user behaviour, ultimately influencing user acceptance of the system (Lucas, 1978 and 1981; Zmud, 1983; Ginzberg et al., 1984; Joshi, 1990 & 1992). More specifically, Grantham and Vaske (1985) and Davis (1993) have suggested that positive user attitudes are an important predictor of system's usage. In the context of this research, the following working definition for positive user attitudes has been derived:

> *'The state in which members of the user community display positive opinions and beliefs towards the information system'.*

It should be noted that, as for user ownership, levels of positive user attitude may vary between different members of the user community and also between different phases of the system's development and operation. Finally, the working definition of positive user attitudes appears in many ways similar to constructs used in other studies, such as '*user satisfaction*' (DeLone and McLean, 1992), '*user information satisfaction*' (Bailey and Pearson, 1983; Srinivasan, 1985) or '*user reactions*' (Clegg et al.,

1997b). However, there is one important distinction; whilst user satisfaction, user information satisfaction and user reactions are typically formulated as responses to a recently implemented system, positive user attitudes is a state which can begin from the project's inception and continue throughout the system's working life.

Whilst some studies have noted the importance of user ownership and positive user attitudes, little work has specifically targeted these factors to identify why they are significant and how they can be achieved. Furthermore, this research has typically been conducted in isolation from the research into best practice. For example, most large studies of best practice factors (for example: Miller and Doyle, 1987; Whyte and Bytheway, 1996; Doherty et al., 1998) do not include user ownership and positive user attitudes. Consequently, it is difficult to judge the relative importance of these factors and their relationship with other best practice factors. The final stage of the research will specifically investigate role of user attitudes and user ownership in a CIS development project.

5.6.2 Additional Research Objective

Prior to the survey research, the overall objectives for this study were:

1. To explore the relationship between the actuality of a CIS project team to adopt best practice and the resultant level of success or failure of the operational information system;

2. To explore the relationship between the level of organisational impact brought about by the system and the resultant level of success or failure of the operational information system.

3. To explore how the organisational impacts resulting from the development and implementation of a CIS can be assessed and effectively managed to ensure that they are positive.

The critique of the literature provided in the previous section has identified several gaps in existing research concerning user attitudes and user ownership. These gaps

have been translated into an additional research objective for the final stage of the study namely:

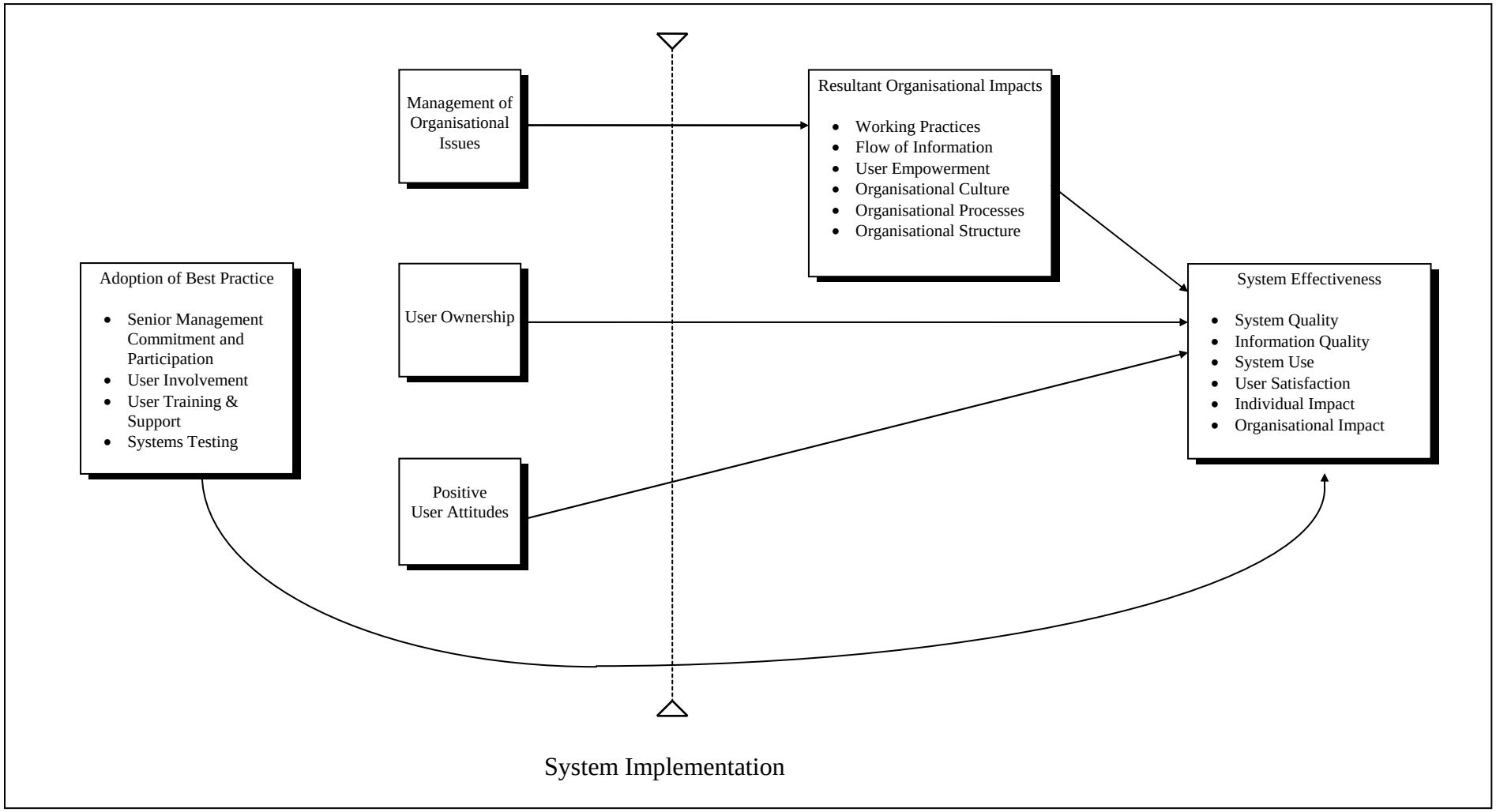
4. To explore the relationship between the ability of a CIS project team to develop positive user attitudes and facilitate user ownership and the resultant level of success or failure of the operational information system.

It was envisaged that this research objective would enable the precise role of user attitudes and user ownership in systems development projects to be determined. In addition, the relationship between these variables and system success was to be investigated. Finally, it was also envisaged that the key management practices needed to develop and encourage the occurrence of both variables could be explored. Figure 5.1 presents the revised research model in the light of the findings from stage 2 of the study.

5.7 SUMMARY

The survey has confirmed that the adoption of best practice, the level of organisational impact, user attitudes and user ownership are considered important to CIS success by IM&T Managers in Community Trusts. The survey findings have also provided evidence to suggest that there may be a relationship between these variables and success. In addition, the survey findings have also provided some preliminary evidence to suggest that certain best practice variables may help to manage organisational impact. However, the findings are limited because they are based on a correlation coefficient analysis. This analysis can only imply association between variables and does not give any indication of the direction of causal links. Consequently, the final stage of this research project intends to explore whether there is evidence to support the suggested relationships; determine the precise nature of these relationships; and develop a greater understanding of how the variables may interact and ultimately affect the success of a CIS. In addition, it was decided that both user attitudes and user ownership should be addressed as distinct issues separate from best practice and organisational impact to develop a clear understanding of their roles. The third stage of the research will use qualitative methods to address these issues and the findings are presented in the following two chapters.

Figure 5-1 Revised Research Model



Chapter 6: Within Case Analysis of Case Studies

6.1 INTRODUCTION

Having developed a wider understanding of the uptake and application of community information systems in England and Wales from the survey results in chapter five, this chapter studies in more detail five Trusts currently using a community information system. This chapter concentrates on exploring, describing and analysing each Trust's experiences in the development, implementation and operation of a CIS through the use of within case analysis. Consequently, many of the results and explanations provided are site specific. Chapter seven provides a higher level, cross-case analysis of the five Trusts that compares and contrasts these results across the different sites.

This chapter begins with a summary of the objectives for the final stage of the research and the methodology adopted. The results for each case study site are then reported with a causal network display presented for each Trust. The results for each Trust follow a similar structure being divided into five sections: organisational background; levels of adoption and effects of best practice variables; the level of organisational impact; the impact on user attitudes and user ownership; and a measure of system effectiveness. Finally, a summary is provided identifying the key points emerging from each Trust.

6.2 SUMMARY OF OBJECTIVES

As has been indicated in chapter five, four research objectives were developed for the final stage of the research. For clarity, these research objectives are repeated below.

1. To explore the relationship between the actuality of a CIS project team to adopt best practice and the resultant level of success or failure of the operational information system;

2. To explore the relationship between the level of organisational impact brought about by the system and the resultant level of success and failure of the operational information system;

3. To explore how the organisational impacts resulting from the development and implementation of a CIS can be effectively assessed and managed to ensure that they are positive;

4. To explore the relationship between the occurrence of positive user attitudes and user ownership and the resultant level of perceived system effectiveness.

In order to operationalise these objectives a series of secondary research objectives were developed for the final stage of the research project. Each of these research objectives is briefly reviewed below.

1. To study and explain the relationship between the ability of CIS project teams to adopt best practice and the resultant levels of effectiveness of the operational information system. It was envisaged that the qualitative research would provide a valuable insight into the complex problems that face CIS Project Teams in attempting to adopt best practice and explain why certain key elements were not always adopted. In addition, the implications of not adopting best practice with regard to the eventual success of the system were also to be explored.

2. To study and explain the relationship between the organisational impact

engendered by the development, implementation and use of a CIS and the resultant levels of effectiveness of the operational information system. It was also envisaged that qualitative research interviews would provide a more in-depth and detailed understanding of the key areas of organisational impact that occurred following the introduction of a CIS and how this impact may influence the ultimate success of the system.

3. To study and explain how the organisational impact resulting from the development, implementation and use of a CIS can be successfully managed in order to ensure that the system achieves high levels of system effectiveness. Although the previous stages of the research project had provided some insight into the first two research objectives, there had been less attention given to the management practices that can be employed to ensure that the organisational impact has a positive effect on the ultimate success of the system. Consequently, this objective was intended to explore the nature of the management practices that may be employed, whether they may involve the use of key best practice elements and assess their effectiveness.

4. To study the relationship between the ability of CIS project teams to encourage user ownership and the resultant level of system effectiveness. This objective was intended to develop a greater understanding of the role of user ownership in systems development projects and to assess the manner in which it may influence the ultimate level of system success.

5. To study the relationship between the ability of CIS project teams to encourage positive user attitudes and the resultant level of system effectiveness. Similarly to user ownership, this objective was intended to develop a greater understanding of the precise role user attitudes play in systems development projects and to assess the manner in which they may influence the ultimate level of system success.

6. To study the relationships between best practice, user ownership, positive user attitudes and the resultant level of system effectiveness. This final objective is

intended to assess how user ownership and positive user attitudes may be effectively managed to ensure that they have a positive impact on the overall success of the system. The best practice variables will be assessed to explore whether they can be employed as management approaches for these issues.

It is envisaged that by addressing these research objectives in both the within case and cross case analysis, an in-depth understanding of the relationships between best practice, organisational impact, user ownership and positive user attitudes can be developed. Furthermore it is envisaged that these research results combined with the results from stages 1 and 2 will provide the basis for a series of practical recommendations for future CIS implementation. The method adopted for the third stage of the research is reviewed in the following section.

6.3 METHODOLOGY

A full discussion of the choice of methods available to conduct the third stage of the research is provided in chapter three. Consequently, this section documents the design of the research instrument, the rationale behind the selection of the case studies and the execution of the research instrument.

6.3.1 Research Instrument Design

Past literature on best practice and organisational impact as well as the evidence from the initial case study research and the questionnaire survey were used to develop questions to be included in a semi-structured interview schedule. This interview schedule, whilst giving the informant a good deal of freedom, was more focused than the exploratory research and enabled the researcher to cover the given set of topics in a more or less systematic way (Moser and Kalton, 1971: p298). The interview schedule had six sections and each section is briefly reviewed below.

Section 1: Biographical and Introductory Questions

The interview commenced with a series of introductory questions intended to gather some additional background information about the informant and the Trust as well as developing a rapport with the informant. Informants were asked about their role in the Trust, the length of time they had been working at the Trust and how they interacted

with the CIS.

Section 2: The Adoption of Best Practice

This section covered the five key best practice variables identified from the previous stages of the research project and supported by the literature review, namely: senior management commitment and participation (Sauer, 1993); user involvement (Wong and Tate, 1994); testing of the system (Flowers, 1997); user training and education (Whyte and Bytheway, 1996); and support and help for staff during implementation (Govindarajulu and Reithel, 1998). The questions for each variable followed a similar pattern: they attempted to assess whether the variable concerned has occurred at the Trust; what form the variable took; whether the variable had varied at all during the project; what obstacles or problems were encountered that were associated with the variable; and on what areas the variable concerned had a significant impact.

It should be noted that following the interviews conducted at the first case study site, Trust A, two additional best practice variables were identified by informants as being particularly important to system success: a well balanced project team and the management of user expectations. Although these two variables have been identified in the existing literature (for example: Chen and Gough, 1995; Ryker et al., 1997) they have not been widely recognised as essential elements of best practice. However, as a result of the importance placed on these variables by informants in Trust A, the decision was taken to probe informants at the remaining case study sites to explore whether similar importance was placed on these issues.

Section 3: The Attainment of Positive User Attitudes

As a result of the desire to assess the precise role of user attitudes in determining the overall perceived effectiveness of a CIS it was considered necessary to address user attitudes in a separate section. Informants were asked: whether they thought user attitudes had become more positive or negative during the development, implementation and operation of the CIS; whether there was any evidence of positive (or negative) user attitudes at the Trust; whether any attempts had been made to develop positive user attitudes during the CIS project; and whether user attitudes had been significantly influenced by any other issues during the CIS project.

Section 4: The Attainment of User Ownership

User ownership was also treated in a separate section during the interviews for the same reason presented for user attitudes. Informants were asked: whether user ownership was occurring in their Trust; what methods had been used to develop user ownership; what problems had been encountered during these development attempts; and the impact user ownership was having on the overall perceived effectiveness of the CIS.

Section 5: Organisational Impact of CIS

The fifth section covered the six main organisational impact issues identified from the literature review and previous stages of the research project, with working practices separated into clinical and non-clinical practices. Consequently, these issues were: empowerment of users (Holmes and Poulymenakou, 1996); changes in organisational culture (Bufferfield and Pendegraft, 1996); changes in the flow of information (Doherty and King, 1997); changes in non-clinical working practices (Hornby et al., 1992); changes in clinical working practices (Hornby et al., 1992); changes in organisational processes (Lyytinen and Hirschheim, 1987); and changes in organisational structure (Stebbins et al., 1995). In a similar fashion to the section on best practice, the questions on each variable followed a broadly similar pattern, the questions attempting to assess: whether the variable concerned has occurred; whether its occurrence was planned or whether it was a reaction to the implementation and use of the CIS; how changes in the variable were managed; what problems were encountered as a result of these changes in the variable; and whether changes in the variable had any other impacts.

Section 5: Non-Directed Interview Section

Informants were also given the opportunity to discuss any other areas that they considered to be important in determining the success of a CIS, that had not been sufficiently covered during the interview. If informants identified any additional issues, then the discussion took a similar approach to the previous sections with informants being asked probing questions about the nature of the variable, how it had been managed and where it had a significant impact with regard to the CIS project.

Section 6: Performance of the CIS

The sixth section of the interview consisted of a short questionnaire that used a five point Likert scale to measure various aspects of the perceived system success. The success measures were adapted from the six generic measures developed by DeLone and McLean (1992) and addressed both user and management perspectives on various aspects of the system. The questionnaire addressed issues such as 'system accuracy / reliability', 'information quality', 'individual impact', 'organisational impact'[11], 'user satisfaction', and 'end-user system utilisation'. In addition to filling in the questionnaire, informants were requested at the time of completion to verbalise any examples they could think of to provide additional support for why they were ticking a certain box. This approach was taken to further improve the validity of the measure of system effectiveness. A full copy of the interview schedule and questionnaire is presented in **Appendix 3**.

6.3.2 Targeting of Case Studies

In studying the responses to the questionnaire survey it became clear that one particular community information system (Comwise, designed by Systems Team) was most common among respondents. It was therefore possible and desirable to concentrate on this sample as it would remove the confounding factor of variations in system design from the analysis. This approach facilitates the development of explanations that are less likely to be undermined by circumstantial variables, such as the design of the system. However, the approach does have the drawback of potentially reducing the generalisability of the results from the Comwise sample to other Trusts not using a Comwise CIS.

To counter this problem, the Comwise sample was tested to measure how representative it was of the main respondent population. Statistical means and variances were calculated for each question in the sections on Best Practice (C),

[11]It should be noted that the use of the term organisational impact by DeLone and McLean (1992) differs from the definition of organisational impact adopted for this study. DeLone and McLean (1992) only refer to organisational impact in terms of the effect of the information system on the performance of the host organisation, whereas this study considers organisational impact to refer to changes in structure, management and ultimately the way an organisation conducts its business.

Organisational Impact (E) and Success (F) in the questionnaire, these being the principal areas of interest for the case study research. A series of t-tests were then conducted for each question to assess whether there were any significant differences between means (Shaw and Wheeler, 1985). Table 6.1 presents the results of the t-tests.

The t-tests indicated that at the 95% confidence level there were no significant differences between the Comwise sample and the main respondent sample. These results show that the Comwise sample exhibits similar characteristics to the respondent group in respect of the variables of interest, while retaining the ability to control for the confounding factor of system design. The Comwise sample group consisted of 18 Trusts and had an additional advantage in that the performance of the system in different Trusts appeared to vary considerably as perceived by the respondents to the questionnaire survey. Therefore, it was possible to employ a multiple case study approach and select a range of Trusts that were using the same CIS but were experiencing contrasting results in terms of the performance of the system.

On the basis of their perceived CIS performance, five Trusts were contacted and in each case the initial contact was through the respondent to the questionnaire, either the IM&T manager or the Information manager. An interview was conducted with each of these key informants at the end of which requests were made for additional members of the Trust to interview. It was considered particularly important to conduct multiple interviews with staff from areas outside the Information and IT Departments of each Trust because this approach allows a triangulation of results and the development of converging lines of inquiry that produce more convincing and accurate conclusions (Yin, 1994 p.92). In addition, the use of multiple sources of evidence can enhance the construct validity of each case study, ensuring that the correct operational measures for the concepts to be studied are established (Yin, 1994 p.33). The clinicians commonly form the largest stakeholder group that use a CIS and one of the key measurements of the success of a CIS is the clinicians' satisfaction with the system.

Table 6:1 Results of T-Tests to Measure Differences Between Respondent Sample

Means and Comwise Sample Means.

Variable	RS Mean	CS Mean	RS Variance	CS Variance	F value	*t* value
C1	4.103	4.250	.691	.600	1.15	-.63
C2	4.059	4.313	.802	.496	1.62	-1.04
C3	2.588	2.500	.873	.933	.94	.33
C4	3.194	3.313	1.250	1.296	.96	-.37
C5	3.456	3.000	.879	10.67	.82	1.68
C6	3.735	3.563	.824	1.196	.69	.64
C7	3.838	3.938	.944	1.129	.84	-.36
C8	3.324	3.375	.998	.917	1.09	-.18
C9	3.672	3.563	1.345	1.729	.78	.32
C10	2.382	2.375	1.314	1.183	1.11	.02
E1	2.794	2.688	1.360	1.563	.87	.32
E2	3.358	3.063	1.021	1.129	.90	1.02
E3	2.132	2.438	1.161	1.329	.87	-.99
E4	3.309	3.438	1.172	1.329	.88	-.42
E5	3.074	3.125	1.024	1.050	.98	-.18
E6	2.544	2.625	1.088	1.050	1.04	-.27
E7	2.075	2.125	.676	.383	1.77	.22
E8	3.529	3.500	1.029	1.067	.96	.10
E9	3.075	3.188	1.434	1.896	.76	-.32
F1	3.456	3.750	.938	.467	2.00	-1.13
F2	3.397	3.813	1.168	.829	1.41	-1.40
F3	3.588	3.875	.962	.917	1.05	-1.04
F4	2.926	3.125	1.233	1.583	.78	-.62
F5	2.838	2.875	1.332	1.183	1.13	-.11
F6	2.779	3.000	1.279	.800	1.60	-.72
F7	3.059	3.438	1.280	1.329	.96	-1.18
F8	2.441	2.563	1.146	1.063	1.08	-.040
F9	2.647	2.563	1.008	.396	2.55	.24
F10	2.824	3.063	1.282	1.129	1.14	-.75

Total valid cases: respondent sample = 68, Comwise sample = 16. F-values tested at .005 level, (2.07) show that variance equality exists. T-test conducted at 95% confidence level, between -1.96 to + 1.96.

The key informants were asked to identify an administrator, a clinical manager and a clinical user who would be willing to participate in the study. It was considered that this combination of potential informants would give a variety of perspectives from each of the key stakeholder groups and enable the researcher to develop a balanced understanding of the experience of using a CIS in each case study. As can be seen, from the breakdown of interviewees presented in Table 6.2, it was not always possible, for practical reasons, to achieve the desired mix of informants, but a sufficient number of informants participated from each Trust to ensure that the results

included clinical staff perspectives as well as the views of IM&T staff.

Table 6:2 Range of Informants Interviewed at Each Trust

Informant	Trust A	Trust B	Trust C	Trust D	Trust E
IM&T manager	X	X	X	XX	X
Manager		X	X	X	X
Senior Clinical Manager			X		
Clinical Manager		X	X		X
Clinical User	X	X	X	X	X
Totals	2	4	5	4	4

Clearly, this approach has a significant drawback in that the key informant (IM&T manager) has control over the researcher's access to additional informants and may choose those informants that are more sympathetic towards the CIS and information technology in general. However, the time and resource constraints of the research project rendered the alternative approaches of increasing the number of interviewees or developing additional contacts within the Trust impractical. Consequently, as well as participating in the interviews, the IM&T manager in each Trust was asked to provide, if possible, documentary evidence, such as published articles, internal reports or newsletters, to help contextualise and verify the interview responses.

6.3.3 Execution of the Research Instrument

After making the arrangements for the interview each interviewee was sent a letter outlining the aims of the research project and indicating the specific areas that would be explored through the interviews. In each case before the interview commenced the informant was again reminded of the areas of interest and that the structure of the interview was not based on any order of importance. It was emphasised to informants that although each section was thought to have some relationship with the success of a CIS it was for the respondent to decide based on their experiences, whether the variable concerned did have significant influence on the success of a CIS. This approach was taken at the outset of all the interviews to ensure that informants were encouraged to provide honest as opposed to desirable responses (Oppenheim, 1992).

Each interview was conducted, in-situ, at the Trust and lasted approximately an hour. To ensure the validity of the interview process, the informants were asked to supply

specific evidence and examples to support their assertions. In the vast majority of cases, the face to face interview was complemented by a follow-up phone call that was used to clarify issues and attain supplementary information. Both the initial interviews and the follow-up phone calls were tape-recorded and later transcribed verbatim.

6.4 DATA ANALYSIS

The analysis followed a similar approach to that adopted for the exploratory research reported in chapter four, section 4.4 and involved the three concurrent activities of data reduction, data display and conclusion drawing/verification (Miles and Huberman, 1994). Data reduction was conducted on each interview transcript using a combination of '*in-vivo*' codes, that is codes derived from phrases used repeatedly by informants, literature based codes and codes developed from the exploratory research.

In addition, marginal remarks[12] made by the researcher were used during the coding period to add clarity and meaning to the transcripts as well as helping to revise and improve the coding structure (Chesler, 1987). An excerpt of the coding list is provided in Table 6.3.

From the codes it was possible to develop a series of within case matrix displays for each Trust. The within case analysis was primarily conducted using the following three displays:

Table 6:3 Excerpt of Coding List

[12]Marginal remarks are pre-analytic remarks made by the researcher during the coding process and usually written on the actual interview transcript. They may point to important issues that a given code may be missing or blurring, suggesting revisions in the coding scheme. A further discussion of marginal remarks is provided by Miles and Huberman, (1994: p66-69).

Senior Management Commitment		User Involvement	
Yes	SMC-Y	Clinical users, DN's, HV's, Physios	UI-CLIN
No	SMC-N	Clinical Managers	UI-CLIN/MAN
No (particular group) e.g. Nursing Directorate	SMC-N(Nursing)	Management	UI-MAN
Active	SMC-ACT	Senior Management, Directors	UI-SEN/MAN
Non-active	SMC-N/ACT	Input staff	UI-INP
Positive message from them	SMC-POS/MES	Procurement	UI-PROC
Provision of Resources	SMC-RES	During implementation	UI-IMP
Setting up of structures	SMC-STR	After implementation	UI-AFT/IMP
Prioritising/attention given to system	SMC-PRI	At all stages	UI-ALL/STAGE
Commitment has risen	SMC-RISEN	User groups, committees, representatives	UI-GROUPS
Commitment has dwindled	SMC-FALLEN	Road shows	UI-ROAD
Level of commitment has not changed	SMC-NO/CHAN	Users involved in the choice of system purchased	UI-PURCHASE
Changes in personnel - yes	SMC- CHAN/Y	Allayed fears of staff by involving them	UI-FEAR
Changes in personnel - no	SMC-CHAN/N	User involvement helped in identifying areas of weakness	UI-INDEN/WEAK

Time ordered displays: The time ordered display was used to show the variations in each variable over time and the major events during the CIS project identified by respondents. This display is primarily descriptive although it does have the value of preserving the historical flow and permitting a good look at the chain of events (Miles and Huberman, 1994: p 110).

Conceptually ordered displays: This display was used to study the variables in more depth and generate more explanatory power. A thematic conceptual matrix[13] was developed for each case to study the manifestation of the variable, the facilitators and inhibitors directly related to that variable and any solutions that had been subsequently proposed or adopted (Miles and Huberman, 1994: p131).

Effects matrix: Finally an effects matrix was also constructed for each Trust. This display concentrates on the outcomes of each of the variables concerned and their effects on other variables and areas associated with the CIS project. Each variable was analysed for positive and negative effects on specific outcomes and whether they

[13]A thematic conceptual matrix is ordered by general conceptual themes, such as 'senior management commitment'.

were considered by informants to be direct or indirect relationships (Miles and Huberman, 1994: p137).

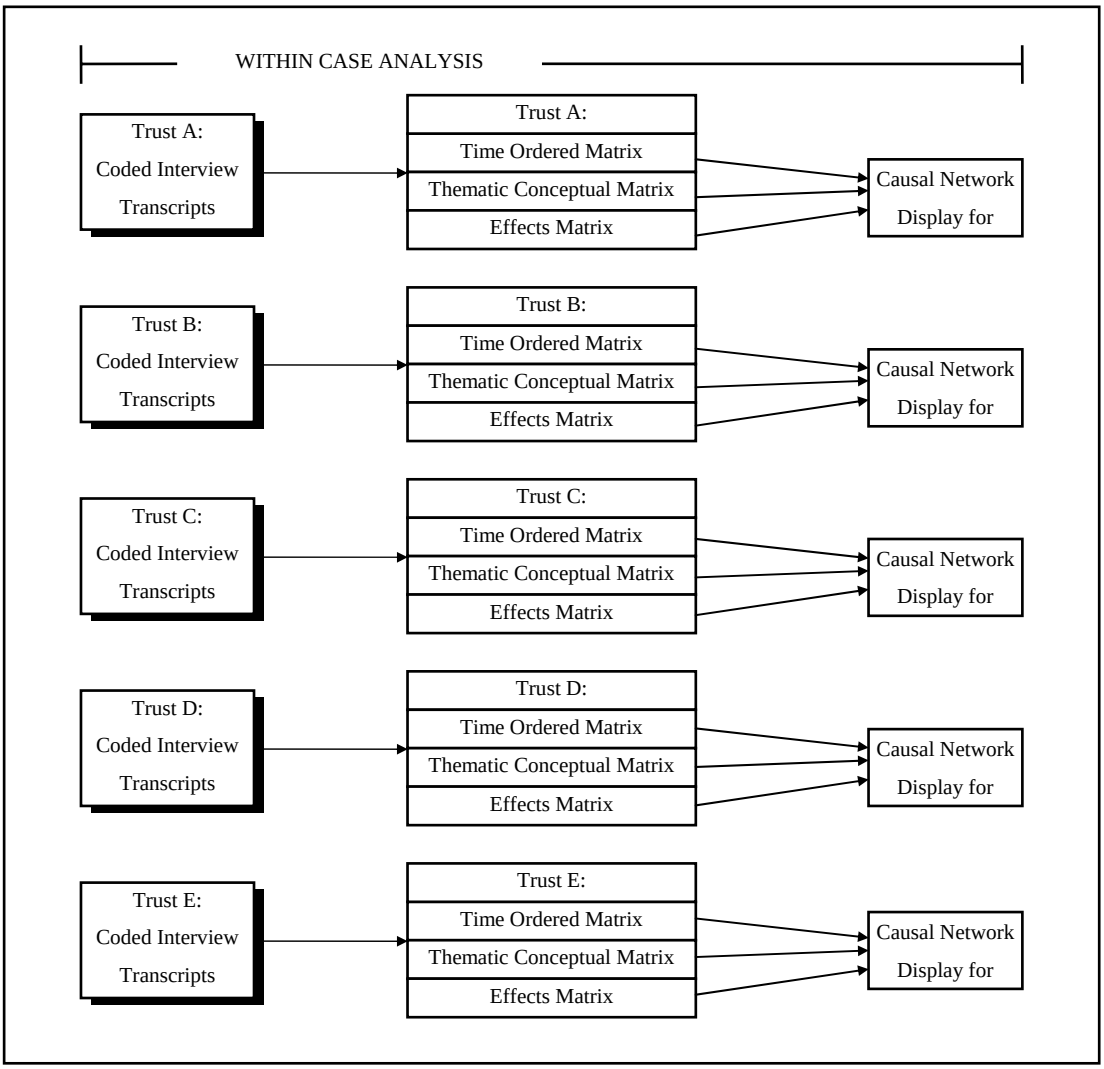
Following the development of these displays[14] it was possible to compose an overall causal network display for each Trust. A causal network is a display of the most important independent and dependent variables in a field study (shown in boxes) and of the relationships among them (shown by arrows). In addition, shorthand explanations for each relationship between two variables are provided on the causal networks (shown by circles). However, it should be noted that where more that one shorthand explanation is provided on a single arrow, then these explanations should be viewed as being independent from one another. They do not represent a cumulative causal chain of events but show multiple explanations for a relationship between two different variables. The plot of these relationships is directional, rather than solely correlational. It is assumed that some factors exert an influence on others: X brings Y into being or makes Y larger or smaller (Miles and Huberman, 1994: p153). The causal network display provides an empirically grounded model for each Trust and is supported by a commentary in the text to explain the relationships identified. As well as providing an overall view of the interactions between the key variables in each Trust the network displays also form the foundations for the cross-case analysis in chapter seven.

In creating the causal network displays each variable was assigned either a rating of high, moderate or low, or positive or negative, where appropriate. These ratings are based on quotes and specific examples given by informants about certain variables. To ensure that the ratings are accurate and that each display has a high construct validity, several tactics have been employed. The ratings are based on multiple sources of evidence and utilise convergent lines of inquiry from two or more informants for each variable, adding more confidence to the rating level (Yin, 1994: p.34). Furthermore, the causal displays were examined by a member of academic staff in Loughborough University Business School and a draft copy of both the causal display and associated narrative was sent to all informants for additional verification

[14]An example of each of the displays is presented in Appendix 6.2

(Miles and Huberman, 1994 p.165). These verification exercises proved extremely useful in confirming both the factual representation in each case and the authors interpretation of certain relationships and some further refinements were made to the final displays presented in this chapter. An example of a causal network display and supporting quotations are presented in **Appendix 5**. Figure 6.1 gives an overview of the within case data analysis.

Figure 6-1 Overview of Within Case Analysis



6.5 RESULTS

The research findings presented in the following sections, take the form of specific examples and comments gathered through the interview process that related to a causal network display for each Trust. Throughout the text references are made to the diagram and utilise either numbers or letters in brackets to point the reader to specific

aspects of the network display. The *numbers* in brackets refer to specific variables, presented in boxes on the diagram and the *letters* in brackets refer to the explanations supporting each relationship identified between variables.

6.5.1 Trust A: Within Case Results

Trust A: Organisational Background

Trust A was granted Trust status in April 1993 and serves a population of approximately 290,000. The Trust provides a range of community services including: District Nursing; Health Visiting; School Nurses; Community Paediatricians; a full range of therapists; and services for adults with learning difficulties. The Trust also operates five community hospitals providing elderly care, elderly rehabilitation, palliative care and child and family psychiatry. Of these services, the District Nurses compose the largest clinical staff group and also represent the biggest group using the CIS.

The Trust had been operating an information system since the late 1980's called Comway that was manufactured by Systems Team plc. In early 1995, the decision was taken to upgrade the system with the prime objective of the project being to develop a better currency for contracting. In reviewing the contract currency, Trust A chose to adopt the care package and care aim approach to record the delivery of patient care. The Trust developed its own system of defining packages of care and utilised three basic outcome measures to assess whether interventions had been successful or not. Following the initial stages of this project it became clear to senior management that as well as improving contracting arrangements the data being collected could also enable clinicians to improve patient care through working more co-operatively and having greater understanding of the skills of different professional groups. Consequently, several additional objectives were set for the CIS upgrade, the most important being the sharing of information between professional groups and enabling staff to monitor clinical activity to improve their clinical effectiveness.

The package that was chosen as the upgrade was the patient centred Comwise

community module that was also manufactured by Systems Team plc. Prior to implementation, the system was extensively **tested** (6) using a test database and was piloted on twelve community staff from a range of service backgrounds at one GP practice. The pilot ran between March and September 1995 and following a positive evaluation the main roll out of the system began in late 1995. The roll out of the system had been predominantly completed by August 1998.

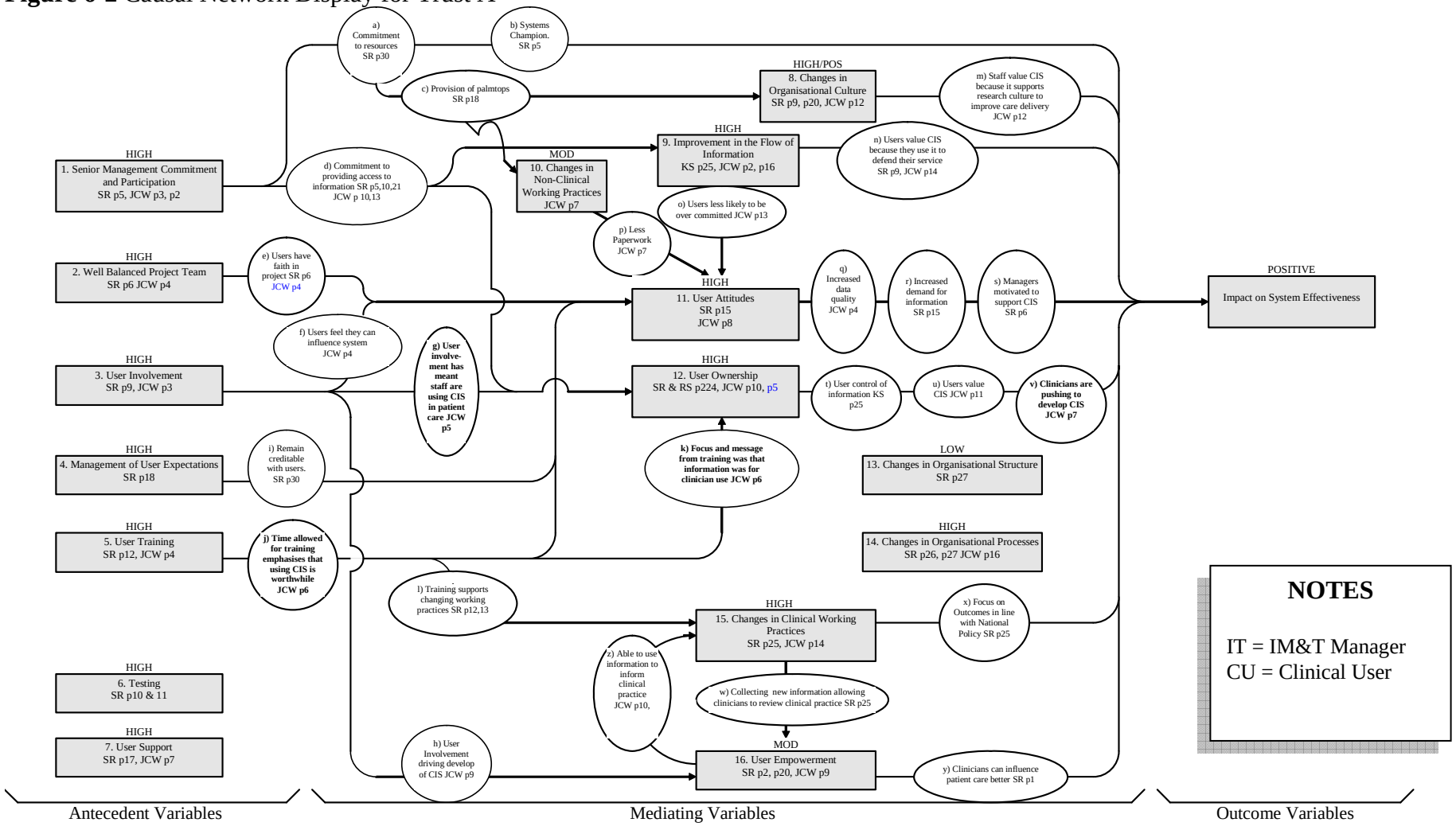
Both clinical and clerical staff enter data onto the system through either paper based systems, palmtop computers that are regularly downloaded or direct keyboard entry, although the majority of clinical staff use palmtop computers. At the time of the interview approximately 450 staff from all community services were using palmtop computers. Staff receive regular standard reports that are printed off centrally from the system and can also request ad hoc reports by contacting the IT service help desk where reports are printed out and returned via the internal post. A more decentralised approach to report writing was being introduced at the time of the interviews, so staff would have the facility to directly access the CIS at health centres and community hospitals and this was expected to further improve clinical staff's access and use of information.

Trust A: The Implications of Adopting Best Practice

It can be seen from Figure 6.2 that informants in Trust A perceived that the Trust had been very successful at adopting the key best practice variables. The informants indicated that there had been high levels of: senior management commitment and participation; user involvement; management of user expectations; user training; testing; and user support. In addition, many of these best practice variables were perceived to have affected the ultimate level of system effectiveness either directly or through mediating variables.

As a consequence of high levels of **senior management commitment and participation** (1) there has been a strong commitment to the provision of resources (a) and the appointment of a systems champion (b), both perceived to have a direct positive effect on the CIS. Furthermore, the provision of resources has meant that

Figure 6-2 Causal Network Display for Trust A



palmtop computers could be bought for clinical staff to use as data entry tools (c) thereby increasing staff's daily interaction with IT and gently introducing the concept of staff using electronic information in their daily work activities. The IM&T manager thought that this exposure to IT had changed staff's non-clinical working practices (10) with reductions in paperwork and had fostered the development of an information culture (8). Having high levels of senior management commitment has also resulted in an overall commitment to providing access to information for clinicians to use for both the delivery of patient care and business decisions that they may have to make (d). This commitment to using information has resulted in general improvements in the flow of information within the Trust (9) with more information being returned to clinicians and similarly has been crucial in helping develop user ownership (12).

An additional variable that emerged from the interviews was the importance of having a **well balanced project team** (2). It was clear from informants' comments that the inclusion of clinical staff within the project team was perceived to have clear benefits. For example informants stated:

> *'I think the thing that has been most important is having somebody with a clinical background. I have a clinical background and we do in this Department make a conscious effort to employ people who were previously clinicians' (IM&T manager, A),*

> *'The fact that the IM&T manager has a clinical background has meant that she has always been very supportive of the clinicians and has wanted to make it work for them' (clinical user, A).*

The most significant benefit from having this clinical knowledge and experience within the project team was perceived to be in developing positive user attitudes. The clinicians view the project team with increased credibility and perceive them to have a greater understanding of clinical needs, a view absent from clinicians when dealing with traditional IM&T staff. The IM&T manager stated that:

> *'I think the thing that has made the difference is that people, rightly or wrongly, have faith in you because they think you understand what they are doing. I have been one of them and I can talk the same terminology as them and I think you come across as not being an information person, you come across as being a clinician that is interested in helping them in using information and that has been the difference in terms of getting the clinical staff on board' (IM&T manager, A).*

It would appear that users are more likely to be positive towards the system if it is presented to them by staff who are considered to also have an interest in returning benefits to clinicians as well as management.

High levels of **user involvement** (3) were found at Trust A and these were also considered important in the development of user ownership and positive user attitudes. Having users involved right from the start of the project has meant that they are keen to use the CIS to support their daily clinical activities (g) which has lead to a sense of ownership (12) and because users feel that their views are considered and listened to in terms of the development of the CIS (f), then this is considered to be helping foster more positive user attitudes (11). Another benefit of user involvement that was identified at Trust A was in contributing to users sense of empowerment. It was stated that because user involvement was driving every development to do with the CIS then the users were beginning to feel a greater sense of power over the direction in which the CIS developed and how it could be best exploited to serve clinical needs (h).

Another best practice variable that emerged from the interviews at Trust A was managing user expectations. Effectively **managing user expectations** (3) was considered to be particularly important to ensure that the project and the project team during the implementation of the system remained credible with the users (i). It was thought necessary to have an ultimate vision as to what the information system was aiming to achieve but also to remain very focused and pragmatic in terms of communicating to users the day to day changes as a result of the system implementation and in so doing keep user attitudes positive towards the system. For

example, the IM&T manager commented, during the non-directed part of the interview:

> *'I think managing user expectations is very important. You need to have a vision so you know where you want to go, but you shouldn't necessarily explain that vision to everybody because I think some clinical staff can't buy in to a three year vision for the future. They live in the here and now and you lose credibility if you start talking about visions, rather than what changes they can expect in the next month.' (IM&T manager, A).*

It was also identified by informants that **user training** (5) was vital in terms of developing positive user attitudes (11), user ownership (12) and supporting changes in clinical working practices (15). It was noted that the fact that clinical staff were allowed time away from their clinical work to attend a training session helped cement the view that the CIS was a priority for both clinicians and the Trust, generating more positive attitudes towards the system (j). In addition, during the training sessions it was felt that there had been a considerable effort made to reinforce the message that the CIS was being implemented for the benefit of clinical staff (k) and that staff were expected to take ownership of the system (clinical user, A). This view was supported by the IM&T manager who stated:

> *'What we are trying to do when we are training them, is not to simply tell them which keys to press, I could get a technician to do that, but rather to discuss about how they are going to be using the information in the future and why they are collecting it in this way' (IM&T manager, A).*

It was also clearly stated that training had a valuable role to play in facilitating the development of new clinical working practices (l). In Trust A the training was divided into two 2 hour sessions. The first session was concerned with the simple data entry methods and general use of the palmtop computers that clinical staff would have to understand for their day to day work. The second session was concerned with wider issues associated with the information being collected by the CIS. This second session attempted to provide staff with a wider understanding of the concepts behind the data

collection and how information can be retrieved and used to support the new care aim and care programme approach to the delivery of patient care. Additional, follow up training was also made available to all staff if they required it and from several evaluations it was thought that staff were generally happy with the training and were satisfied that they were sufficiently prepared to use the CIS.

As well as the training, a specific **support** element (7) was created during the CIS implementation in the form of an IT help desk that has continued during the subsequent operation of the system. Similarly, it was thought that staff were satisfied with the levels of support provided for the CIS and that as the roll out of the system had continued so a pool of knowledge had been created encouraging staff to ask their colleagues for help rather than having to rely on central support.

Trust A: Level of Organisational Impact

As well as showing the adoption of best practice, Figure 6.2 also gives an indication of the level of organisational impact Trust A has experienced as a result of the implementation and operation of a CIS. It can been seen from the diagram that the CIS is perceived to have had quite a high organisational impact and that specific aspects of this impact are thought to have direct influence on the systems effectiveness. For example, it was noted by the IM&T manager that changing the **organisational culture** (8) of the Trust was an explicit aim for the implementation of the CIS in Trust A. The change in the Trust's organisational culture had also coincided with a more evidence based culture that has gradually emerged in the NHS over the last 5 years and the CIS can be used by staff to support the process of running action research projects to improve patient care. Consequently, staff associate value with the CIS as they perceive it to be helping with clinical research projects that in turn has a positive impact on the perceived effectiveness of the system (m).

Similarly, positive changes in the **flow of information** (9) were also planned in Trust A to provide a more accurate and representative contract currency and to support staff in their clinical work. The positive changes in the flow of information have meant that clinical staff and managers get regular reports detailing their case load lists, the care programmes being used, the average number of interventions in an episode, the

average length of episodes and the outcome of finished episodes. This additional information has enabled staff to be in a stronger position in which to defend their service and make requests for additional resources both to internal managers and to the local health authority (n). Clinical staff also feel that they are now less likely to be over-committed because they are involved in business planning and predicting activity enabling them to be set at more realistic levels (o). Both these improvements have led to positive impacts on the perception of system effectiveness within the Trust, either directly from users using the system to defend their service or indirectly by helping to develop positive user attitudes towards the system that in turn improve the likelihood of the system being viewed as a success.

Moderate changes in **non-clinical working practices** were also considered to have had a positive effect on user attitudes because of a reduction in paperwork (p), although these changes were not explicitly planned. The introduction of palmtop computers has meant that clinical staff have been able to enter their data quicker than using the previous paper based system that has helped develop more positive user attitudes. The movement away from paper has been a major aim within the NHS for several years since the white paper, Seeing the Wood, Sparing the Trees (NHS, 1996) and any positive move away from paper is likely to be associated with positive developments for both staff and patients and a reduction in bureaucracy.

In contrast, changes in **clinical working practices** (15) were explicitly planned to coincide with the implementation of the CIS. A conscious decision was made by senior managers to adopt the care aim and care package approach to the delivery of care. This is probably the best example of the pro-active adoption of new practices to ensure that there is a good fit between the system and the Trust. The adoption of these new clinical working practices was likely to have occurred in due course within the Trust, their introduction being driven by the NHS Executive. However, the CIS facilitated the introduction of the new style of working and as such it appears that the ‘fit’ between the organisation and the system was desired rather than enforced from a need to conform to the system design.

The adoption of these new clinical working practices have resulted in a number of

benefits. The clinical delivery of care is now in line with current national policy with clinicians focusing on the importance of monitoring outcome measures (x) and the new working practices have led to increased empowerment for staff. The data that are now being recorded by the CIS, because they are based around outcome measures, provide the basis for staff to be able to set targets for certain treatments and measure whether these targets have been met (w). The staff are therefore able to review and monitor their own working practices and compare their efforts to existing research and make adjustments as required (z). Consequently, staff are more empowered (16) to use the new information to continually improve their clinical practice. This improvement in clinical practice means that the quality of patient care is increased, that in turn raises the system's perceived effectiveness as it is the initial data collection that provides the foundation for these positive developments (y).

The concept of user **empowerment** (16) also emerged as an important issue during the interviews and it appeared that the CIS was intended to help empower users. The comments made by informants clearly indicated that a moderate level of empowerment was occurring for users and that they expected it to increase in the future. Some logistical problems with the technology had inhibited developments in this area and although these had been resolved at the time of the interviews it was felt that the level of empowerment that was desired by the project team had not yet been achieved.

Some organisational impact was also identified in terms of changes in **organisational processes** (13) although it was unclear whether these changes were as a direct result of the CIS. Improvements have been made in co-ordinating the discharge of patients and the process of making a multi-disciplinary assessment was under review. There had also been improvements in the negotiating of contracts with the process being a lot more responsive and tighter since the information had been available from the CIS. However, no relationships were identified between this impact and the overall effectiveness of the system

There had also been very little change in terms of the **organisational structure** (14) of the Trust resulting from the operation of the CIS. Consequently it would appear

that although some pro-active efforts have been made to ensure a good fit between the CIS and the Trust these have not been particularly radical changes in terms of the overall structure and processes conducted in the Trust's day to day operation.

Trust A: User Attitudes and User Ownership

As has been stated previously, user attitudes and user ownership were treated separately from the other areas of organisational impact so their precise role could be explored. Consequently, during the interview both variables were discussed in separate sections outside both best practice and organisational impact. In discussing user attitudes at Trust A it was clear that informants perceived user attitudes to have improved throughout the development, implementation and operation of the system. Users are believed to be more committed to entering data accurately and on time and are keen to make use of the information that is available from Comwise. It was also noted that staff were generally more positive when discussing the system at meetings and at other points of contact.

The development of positive **user attitudes** (11) had a number of positive impacts on the systems overall effectiveness. Direct effects have included an improvement in data quality with staff having a greater inclination to record and reflect what they do accurately (q). This enthusiasm for the system has also helped persuade clinical managers that the system is providing benefits for staff and as a result they have been more supportive of the project (s). The positive user attitudes towards the system have also resulted in an increase in the demand for information from clinicians (r) and a greater pressure on the central reporting services to produce reports. It is likely that this increased pressure will result in a decentralising of reporting facilities allowing clinicians greater access to information on a more 'hands on' basis in the future. The IM&T manager noted that:

> *'That is my biggest difficulty. It's like a self perpetuating thing. The more you work with people getting them to use and understand information the more they ask for it and that in itself is a problem, because while you have a raft of reports that people are asking for, you can't spend time developing the next thing' (IM&T manager, A).*

High levels of **user ownership** (12) were also identified at Trust A and it was stated that the achievement of user ownership was a deliberate policy from the project team during the implementation of the CIS (clinical user, A). It was also noted that because there are such high levels of user ownership any technical difficulties that result in the system being inoperative are not greeted with indifference from staff but demands for action to get the system working as they need it for their day to day activities. For example, the clinical user stated:

> *'There have been snags in the system that have been extremely frustrating for the clinicians. I mean we have had problems recently with upgrading to make the system millennium compliant that has led to a whole load of bugs in the system. We can't always run the operational procedures that we have been using in the past so you get double the frustration because there is ownership and because we use it [CIS] to inform our clinical practice. Information Services certainly hear about it when it doesn't work!' (clinical user, A).*

The occurrence of user ownership was perceived to be having three positive impacts on the overall effectiveness of the system. Firstly, user ownership has meant that the users perceived themselves to be in control of the information that they were collecting and that it was of use to them in their clinical practice (t). The staff viewed the collection of information via the previous paper based methods to be purely for management purposes and consequently the system is viewed as being more effective than the old approach to collecting data.

Closely linked with this impact is the fact that high user ownership is perceived to result in the users placing greater value on the CIS (u). This relationship was identified by a clinical user who indicated that achieving user ownership was vital in ensuring that the CIS is a success. Due to the decentralised nature of Community Trusts and the autonomy of Community Staff the success of the system is very reliant on staff believing in the value of the system and therefore making the effort to enter data correctly and generally make use of the information available.

Finally, the third positive impact from high levels of user ownership is the fact that clinicians are more likely to drive the development of the system to ensure that its full clinical potential is realised (v). It was thought by informants that high ownership meant clinicians were keen to generate new ideas of how information from Comwise could be used to monitor and improve clinical practice and therefore the delivery of patient care.

Trust A: Measure of System Effectiveness

As discussed in section 6.3.1 (research instrument design) of this chapter, a short questionnaire was conducted with each informant at the end of the interview and the results were aggregated into an overall success score. It should be reiterated that although the performance measure is only intended to give a broad indication of the level of performance of each CIS, it did provide some useful comments. In the case of Trust A the CIS was generally viewed to be performing well. The quality of reports produced from the CIS were of reasonable quality in terms of accuracy, timeliness and relevance although there was room for improvement. It was felt by the both the clinical user and the IM&T manager that management information needs were being met particularly well by the CIS. The IM&T manager stated that:

> *'I think our information needs are being met extremely well because of the fact that we have actually used the CIS in real life, particularly last year when we were looking at the introduction of Intermediate Services and the reduction in Chiropody and Children's Services. We were able to use the information from the CIS as the basis of the discussion to decide the way we would make the changes.' (IM&T manager, A).*

Similarly, both informants felt that management liked the CIS and the information they received from it. An informant commented that:

> *'I think on the whole managers like the information and the ability to request reports. They can't always be produced in a timely way, but I would say that they do like the information' (clinical user, A).*

In terms of the clinical users both informants felt that their clinical information needs were being met by the CIS and that generally clinical staff liked the CIS. It was perceived that the CIS had facilitated some improvements in the performance of the Trust through the use of information from Comwise although informants had difficulty in citing specific examples. It was felt that there was a positive attitude being exhibited by staff and that this had contributed to a desire to be involved with using information to improve services. The IM&T manager indicated that the message coming from clinical staff was,

> *'we are really committed to it [using information], we have seen the way information is used in Children's Services and Chiropody and we know it is essential that we do it. We are anxious that our colleagues may not be working consistently and we want to make sure that they do' (IM&T manager, A).*

In terms of specific examples the IM&T manager went on to say,

> *'I haven't got a quantitative experience but I suppose it is qualitative in the sense that its impressions that people give you when they needn't have said anything or they could have been very negative. They chose to be particularly keen and it was not prompted in the sense that I had gone to talk about something completely different' (IM&T manager, A).*

It was also thought by informants that the CIS had helped improve the functional output of the Trust, in terms of the effectiveness and efficiency of services and to some degree it was thought that it may have reduced costs. However, this benefit was qualified by the IM&T manager (A) who stated,

> *'I guess the NHS would like to think that it [CIS] saved costs. I suppose in terms of reducing duplication, it technically reduces the costs except that in Community Services your cost is timed, so if you are not doing one thing you are doing another. So you don't stop doing a particular task and save that time. You spend the time on something else.'*

The areas where the CIS performed less well were in its technical capabilities. For example, there were problems with the system's reliability that meant that the system was sometimes unavailable to clinicians resulting in considerable frustration when they came to download their palmtops at the end of the day. Also the functionality of the system sometimes inhibited clinicians, the system on occasions being unable to record some clinical activity in the manner in which the Trust desired. One concern that was noted during the interviews was whether the CIS would be flexible enough to be adapted in the future as clinical practice evolves. However, it was considered by informants that overall, the technical problems associated with the CIS were not likely to adversely affect the effectiveness of the CIS in the long term, so long as they were carefully managed and the CIS continued to provide tangible benefits.

Consequently, looking at the performance measures overall the CIS appears to have been reasonably effective at Trust A at the time of the interviews. Both clinicians and management are thought to be satisfied with the system and there are positive feelings towards the use of information within the Trust as a whole. Some technical difficulties have meant that the system and the supplier have been criticised at times, however, these problems do not appear to be adversely affecting the overall perceived effectiveness of the CIS. This positive overall impression provided by informants is reflected in the overall success score of 4 out of 5 for Trust A's CIS.

6.5.2 Trust B: Within Case Results

Trust B: Organisational Background

Trust B provides services in three main areas; community; acute; and mental health. The community services constitute the largest service area within the Trust and predominately consist of District Nurses, Health Visitors and School Nurses. The Mental Health Services are largely made up of Community Psychiatric Nurses, Learning Disabilities and Clinical Psychology and in addition there are several Professions Allied to Medicine (PAMS) groups including Chiropody, Physiotherapy, Speech and Language Therapy and Occupational Therapy. The Trust also operates seven community hospitals providing a range of services including community and acute. Of these services, the District Nurses and Health Visitors compose the largest

clinical staff group both in terms of the total number of staff employed at the Trust and those using the CIS.

Staff at Trust B have been using a CIS since 1988 called Comway 2000 manufactured by Systems Team plc. In early 1993 the decision was taken to introduce palmtop computers to support the CIS and these were subsequently introduced in March of the same year. No further significant changes were made to the system until 1997 when, due to a lack of Year 2000 compliance the senior management of the Trust decided to upgrade the system. In addition to solving the Year 2000 problem, the main driver for the upgrade was to enable staff to monitor their clinical activity in order to improve their clinical effectiveness. Other drivers that were also identified were to develop a system that was capable of linking to other systems external to the Trust and to provide the proposed mandatory NHS Community Minimum Data Set when it was implemented.

The senior management of Trust B decided to stay with their current system supplier and adopt the Comwise community module as the upgrade for the CIS. The CIS was **tested** (2) in-house by setting up a duplicate database and thoroughly examining the new upgrade for errors compared to the old system. It was stated by the IM&T manager that it had not been possible to run a pilot of the upgrade because the configuration of the system prohibited the running of both systems side by side. Consequently, once the Project Team were satisfied with the in-house testing on the test database all the palmtops were recalled and reinitialised over a single weekend allowing the system to go completely live the following week. The roll-out started in May 1997 and by August 1998 almost all the professional groups were using the new system.

Both clinical and clerical staff enter data onto the CIS using either paper based methods, palmtop computers that are downloaded at least once every seven days or direct keyboard entry. At the time of the interviews the majority of staff used either palmtop computers (339) or direct keyboard entry (202) and by the end of 1999 it was expected that more than 600 staff would be using the CIS. Staff are given a series of standard reports provided from the CIS and they can also request ad hoc reports that

are generated by the Information Department and sent to staff via the internal post. Further improvements in communication were being developed at the time of the interviews with email being introduced across the Trust and it was also intended to provide printers to support the desktop computer in each health centre. It was envisaged that the provision of printers and more desktop computers would allow staff greater access to more timely information from the CIS in the future.

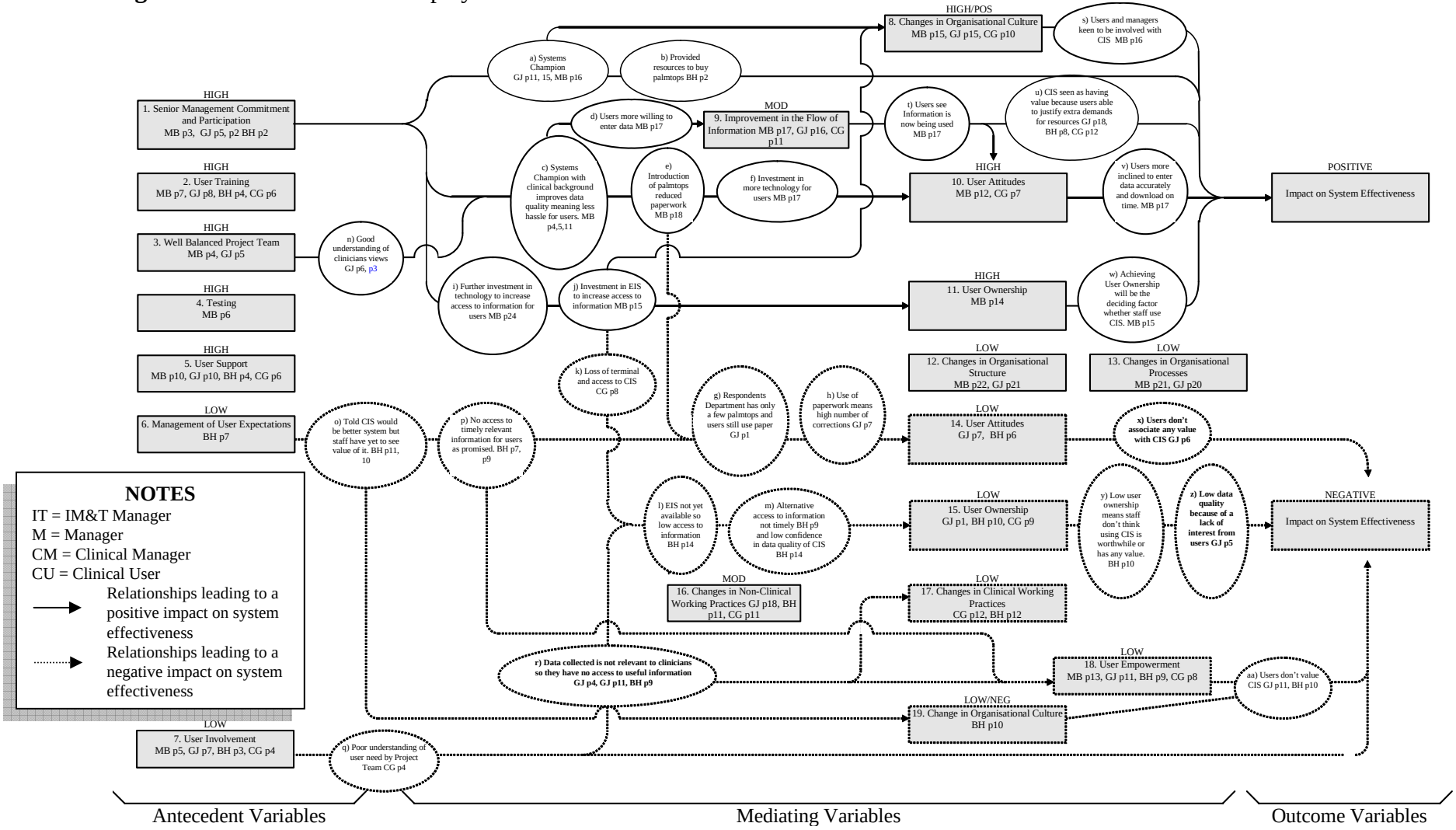
Trust B: The Implications of Adopting Best Practice

Figure 6.3 shows that Trust B has been reasonably successful in adopting some but not all of the key best practice variables and that the level of adoption had varied throughout the project. Moderate levels of senior management commitment and having a well balanced project team were identified by informants as having a positive impact on the system, however, they noted that low management of user expectations and generally low levels of user involvement had a negative impact on the overall level of system effectiveness. It was also noted by informants that these impacts could either directly influence the effectiveness of the system or have more indirect effects that were dependant on mediating variables.

For example, it was noted by the IM&T manager that **senior management commitment and participation** (1) had risen over the last five years. However, prior to 1993 there had been little support from senior management for the old system largely because of poor data quality. The data entered onto the system was not monitored and it is likely that the high number of errors on the system at the time was a reflection of the lack of priority given to accurately recording data by clinical staff. In 1993 a new Head of Information was appointed who had a strong clinical background within the Trust and he soon became viewed as a champion for the CIS (a), going to great lengths to improve the data quality by checking the data on the system, looking at the recording methods and changing them, finding the errors and where figures had become distorted and generally emphasising the need to start making greater use of the system for both managers and clinicians. In improving the data quality and identifying the potential of the system the IM&T manager felt that the systems champion ‘sold’ the system to senior management who gradually became more positive and in turn began sending out a positive message to other staff about

the value and importance of the CIS. Consequently, by the time of the upgrade and

Figure 6-3 Causal Network Display for Trust B



subsequent roll out of the Comwise System senior management commitment and participation had increased significantly.

As a result of having high levels of senior management commitment and participation (1) the role of the systems champion (a) was supported and encouraged and there were resources made available to support the continued development of the system, for example, through the purchasing of palmtop computers (b), which resulted in a positive impact on the overall effectiveness of the system. It was also thought that the senior management commitment was manifested in the purchase of an Executive Information System (EIS) (i). This purchase had in turn helped in changing the organisational culture of the Trust, by making it more information orientated. Indeed, from the interviews as a whole it was clear that the former Head of Information had been held in very high esteem and that his personality had been very significant in improving many aspects of system effectiveness.

The fact that the systems champion was able to improve the data quality (c) of the system had an additional benefit for the clinical users because they were no longer getting complaints from their line managers about the inaccuracy of the data and having to do lengthy error correction exercises. Consequently, the users became more positive about the system and more prepared to enter the data (d) helping improve the overall flow of information (9).

In addition, the introduction of palmtop computers in certain professional groups reduced the amount of paperwork that clinical staff had to deal with (e). The added investment helped ensure that there were adequate download points in the peripheral geographical areas of the Trust (f), again providing a strong message that the CIS was viewed as a priority within the day to day activities of the Trust and helping develop positive user attitudes (10).

However, the introduction of palmtop computers was not applied universally across the Trust because of financial constraints. Only those service areas within the Trust that were not currently recording patient based information were initially targeted for investment to get a standard approach to data recording across the Trust in line with

NHS policy guidelines. Consequently, some service areas at the time of the interviews were lacking in the provision of CIS hardware. For example, a manager, whose Department was part of the second wave of investment in palmtops, indicated that staff in his Department were still experiencing high levels of paperwork (g). The high use of paper returns was thought to be contributing to the number of errors (h) on the system because staff were not using electronic methods of data entry. Consequently, staff were spending time recording data and then more time doing subsequent error corrections, both activities viewed by clinicians as detracting from patient care. The manager believed that these high levels of paperwork and error correction were in turn, contributing to negative user attitudes (14) from the clinical staff and stated that:

> *'I think if they were being honest with you they would say that since the implementation of the system it's been one of the biggest banes of their life, purely from the corrections that have come' (manager, B).*

Senior management commitment and participation was also thought to be important in developing user ownership (11). It was thought that the investment in printers to be located in the community health centres (j) and the introduction of an EIS (i) would allow both clinical managers and staff to have greater access to information and thereby develop a greater sense of ownership. Conversely, a clinical user noted that they felt less ownership of the system since they lost their personal desktop computer and direct access to the CIS (k). Similarly, a clinical manager stated that in the health centre where they were based the EIS had still to be implemented (l) and that the current alternative access to information was not timely enough for staff and generally both staff and managers had low confidence in the quality of the data (m). Consequently, three informants stated that there was little evidence of user ownership in the areas in which they worked.

Having a **well balanced project team** (3) was also considered to be important in ensuring that the CIS was effective. To develop a well-balanced project team a systems champion (a) with a strong clinical background was appointed as Head of Information. Two informants perceived a well balanced project team to be very important in helping ensure the system was perceived as a success. One informant

noted:

> *'I certainly think that when the Head of Information was in post, the future was bright. He certainly did seem to make a tremendous difference. I think that was also from the point of view that he came from a clinical background and so understood the needs of clinicians along the line' (manager, B).*

Having a well balanced project team was thought to have been particularly helpful in developing positive user attitudes towards the system. It was noted that because of the Head of Information's clinical background he had a good understanding of clinicians' views (n), was able to allay staff fears about the system and convince clinical staff that he and his project team were interested in making the system effective for both management *and* staff. For example, the manager continued:

> *'There were certain fears that clinicians have that in many instances the Head of Information dispelled because he had the ability to say, 'You don't have to worry about that, I'll deal with that.' It is very important to have somebody that knows what they are talking about with the hardware, but also understands clinicians' views' (manager, B).*

It was perceived by informants that there had been high levels of **user training** (4) since the palmtops were introduced in 1993. The training involved the clinicians being given a dummy palmtop computer to play with following which the trainer took them onto the live system and they were given a series of sessions on different aspects of the system. This approach enabled the training to be based around the users own caseload making it more realistic for staff. The training for each group takes about two weeks with about 8-16 lessons depending on how easily the staff understood the system. The trainer provided staff with about half a day per group site and staff dropped in when they were able to do the training. In addition refresher training was also made available to staff who still experienced problems after the initial sessions and generally the training was well received by the users. As one manager noted,

> *'It's certainly my impression that a lot more thought was put into the training of*

staff with palmtops than anything that had gone previously' (manager, B).

Although no explicit links were identified between the training and high levels of system effectiveness the training was clearly considered to be a vital element in the implementation process. For example, a manager stated,

'I think one or two people understood the consequences of not getting it right and giving people pieces of kit that they are not au fait with' (manager, B).

The results suggest that the informants considered the training to be a necessary part of the implementation of a new system and not a separate issue that may or may not be adopted during the system development process.

A similar situation was reported with regard to **user support** (5). Again informants did not identify any clear links between user support and system effectiveness but generally it was considered that there had been high levels of user support provided. The support consisted of a help line that staff could ring should they need assistance and the trainer and staff in the Resource Management Department also made themselves available for enquires regarding the CIS. Most of the informants concluded that staff had been satisfied with the support that was provided to them throughout the implementation and operation of the system.

However, there were several areas where low adoption of best practice variables were considered to be having a negative effect on the system's effectiveness. It was reported by informants that there had been poor **management of user expectations** (6) because staff's hopes and expectations of the system capabilities had been raised but not realised (o). A clinical manager stated, '*we were told it was going to be a better system but we have yet to see the value of it'*. Not delivering to user expectations coupled with low access to timely, relevant reports (p) were both thought to be contributing to negative user attitudes (14). Furthermore, these deficiencies were also thought to be restricting the development of user empowerment (18) because staff had no information with which to make informed decisions about how they chose to deliver their patient care.

Closely linked to these issues was the effect of low **user involvement** (7). A clinical user stated that having low user involvement could have a direct negative effect on the systems effectiveness because of a poor understanding of user needs by the Project Team (q), although it was unclear whether this had actually occurred. It was also noted that low user involvement resulted in much of the data being collected by the CIS having little direct relevance to clinicians and being of minor use in their day to day practice (r). This lack of involvement and irrelevant data collection was considered to be inhibiting user ownership, empowerment and developments in clinical working practices. The occurrence of user ownership was restricted because clinical staff had no control over what data were collected and as a result did not view the process as collecting 'their' data. User empowerment was inhibited because the data being collected was not relevant to clinicians and so could not support the empowerment process. Finally, clinical working practices were inhibited because the data collected did not give staff a greater insight into their current practices and therefore highlight any areas that should be reviewed.

Trust B: Level of Organisational Impact

It can be seen from Figure 6.3 that the implementation and operation of a CIS at Trust B is considered by informants to have had both positive and negative organisational impacts. These impacts in turn have either had a positive or negative influence on the overall perceived system effectiveness. Changes in **organisational culture** (8) is one aspect where informants recorded mixed views about whether the cultural change had a positive or negative effect on the system. The majority of informants thought that initially cultural change had not been planned and that a more positive organisational culture had only started to emerge since the arrival of the systems champion. It was reported that the systems champion had targeted changing the organisational culture of the Trust as a key element for making the system more successful. It was noted that this new culture was manifested by users and managers becoming more keen to be involved with the CIS Project (s). Conversely, one clinical manager thought that the **negative change in organisational culture** (19) towards IT since the introduction of the system was still occurring despite the efforts of the systems champion. She stated that staff viewed the system as a 'Big Brother' watching over them and as a tool by which the staff could be 'policed'. Consequently, it was felt that users in the clinical

managers immediate area did not value the CIS, *'no matter how positive managers attempted to be about the system,'* (aa). Taking an overall view, the comments of informants suggest that a positive change in organisational culture is exhibited by the majority of staff in Trust B although it would appear that pockets of a negative organisational culture are still found in some areas.

Informants were more consistent in their views towards changes in the **flow of information** (9). Overall, it appeared that there had been moderate improvements in the information flow since the upgrade of the CIS and that these changes had been planned. More accurate and relevant reports were being produced showing the monthly activity of staff and there has been an improvement in the speed of the contract review process. It was noted by one informant that there appeared to be a greater emphasis now from the Information Department on providing information for staff, rather than staff inputting into a 'black hole.' It was thought that these improvements were helping develop positive user attitudes because staff could now see the data they were collecting being used in a practical way to improve service provision (t). In addition, because some staff have had greater access to information they have been able to make more substantiated demands for extra resources (u). For example, resourcing reviews are carried out periodically within the Trust and a clinical user stated that her professional group had used information from the CIS to make a case for the employment of an additional member of staff that was subsequently agreed by Trust management. The ability to justify extra resources for clinical issues through using Comwise has meant that staff place a greater value on the system because they can see direct benefits.

It was generally felt by informants that little **user empowerment** (18) had occurred since the introduction of the CIS. The IM&T manager indicated that should the Trust adopt a care package and care aim approach to the delivery of patient care, combined with multi-disciplinary groups, then there would be greater opportunity for user empowerment. It was thought that these new approaches would mean that data would be collected in a manner that allowed clinicians greater opportunity to review their clinical working practices and make changes as they saw fit. A clinical manager also indicated that they would like to move away from recording contacts to record

outcomes of care to help inform clinical practice. However, it was unclear whether the Trust intended to adopt these practices in the future.

It is interesting to note that while improvements in the flow of information have encouraged users to value the CIS, so the lack of user empowerment has reduced this associated value. It is suggested that the reason for this discrepancy is largely due to the frequency that the CIS proves its value to front line clinicians. The resource review process that was cited by the clinical user occurs, at most, on a yearly basis and so is relatively infrequent. In addition, it appears from informants' comments that few regular, relevant reports were available to front line clinicians. Consequently, this low access to information has inhibited user empowerment and reduced the day to day value that clinicians place on the system(aa). However, it should also be noted that the Trust Management had identified this problem and, at the time of the interviews, were preparing to introduce printers at several health centres to facilitate a greater return of information.

Little change was noted in terms of **organisational structure** (12) or **organisational processes** (13) at Trust B. The only noticeable change that had occurred in the Trusts structure since the introduction of the CIS had been the creation of the Information Department that was thought to have some benefit in raising awareness in the use of information but no specific relationships were identified. Minor changes in organisational processes had also occurred with improved contact with GP fundholders and a better information flow however, this change will be of less significance now as GP fundholders are being phased out. The only other change was a reduction in the number of codes used to collect data thereby streamlining the data recording process for staff.

Some changes were reported regarding **non-clinical working practices** (16). Of these changes the biggest was when staff had to register their own case load as the volume of paperwork that staff had to deal with increased dramatically. However, this volume of paper has now been reduced because clinical staff no longer register patients, the whole process now being administered centrally by the IT and Resource Management Departments. Some minor benefits that were identified from changes in non-clinical

working practices were through time saved as staff became used to using palmtop computers and also in generating reports on activity that were previously collected manually and can now be provided by the CIS.

It was also noted that there had been limited changes in **clinical working practices** (17) and it was thought that this was largely due to the decision not to adopt a packages of care approach and a low return of information to staff. For example a clinical user stated:

> *'I am sure if you get information about clinical issues and maybe the length of treatment, for example somebody might get information back saying that they had this patient on treatment for so long, so it could obviously influence you, but our manager doesn't get that sort of information.' (clinical user, B).*

Consequently, it was agreed by informants that the few changes in working practices which had taken place, either clinical or non-clinical, had no significant effect on the overall perceived effectiveness of the CIS.

Trust B: User Attitudes and User Ownership

Informants at Trust B provided mixed views regarding both user attitudes and user ownership. For example, both the IM&T manager and a clinical user felt that **positive user attitudes** (10) had developed over the last five years towards the system. They felt that users were very happy using palmtop computers, did not want to return to paper based recording and were demanding more reports via their immediate managers. It was felt that the CIS was no longer a topic of conversation and that there were less complaints about the system indicating that staff were not exhibiting their previous negative attitudes towards the system. It was thought that these user attitudes were having a positive impact on the system because staff were more likely to enter data accurately and download on time because they perceived the information to be of benefit to them (v).

Conversely, a more negative impression was provided by the manager and clinical manager. Both these informants perceived that there were **negative user attitudes**

(14) towards the CIS because the data on the system were not accurate and consequently the activity levels of staff were presented as deficient. As a result of these low activity levels staff are under pressure from their managers to increase activity. This cycle is thought to be generating a negative attitude from staff who already believe they are working as hard as possible and are blaming the system for the additional pressure. Consequently, users resent the system, viewing it as an intrusion on their clinical activity with little value leading to a negative impact on the system's effectiveness (x).

Only the IM&T manager believes that moderate levels of **user ownership** (11) are starting to develop in Trust B. The IM&T manager stated that achieving user ownership was an aim that the former Head of Information had been working towards for some time, allowing clinical staff to have greater control over the information that is collected by the CIS. Achieving user ownership was thought to be crucial to the success of the system by the IM&T manager who stated that should user ownership not be achieved, then they could not expect clinical staff to make any use of the system (w).

In contrast, the majority of informants in Trust B stated that they perceived **low user ownership** (15) to exist at the time of the interviews and that this lack of ownership was having a negative effect on the system. It was thought that the lack of ownership had resulted in clinical staff being disinterested in CIS data collection and viewing the process as detracting from their primary role, the treatment of patients (y). Furthermore, this lack of ownership is thought to have negative implications for data quality (z) with a manager stating that:

> *'Without user ownership of the data the users won't feel they are involved and controlling what data is collected and then you have problems. They will only see the process of recording data as a professional requirement and will adopt an attitude of, "Well I have treated the patient, I have done my requirement, why should I record data as well?" They will not be interested in recording the data or recording it accurately.' (manager, B).*

As has already been noted the poor data quality of the system can further compound users' negative feelings towards the CIS because of the pressure to keep activity levels up and the volume of error corrections that staff may have to carry out. Consequently, it was felt that low user ownership was having a negative impact on the overall system effectiveness of the CIS.

The difference in views reported about the occurrence of positive user attitudes and user ownership indicates that these variables may well vary across the Trust. It would appear that more staff have positive user attitudes towards the CIS, apart from in the working area of the clinical manager, however, there was little evidence of user ownership to be found across the Trust. The lack of agreement about the existence of user ownership could be explained because user ownership may have been a new occurrence and may not have reached all areas of the Trust at all staff levels. The IM&T manager may well be able to detect a change sooner that the staff on the ground because they are closer to the mechanisms that are intended to develop a greater sense of ownership. However, it should also be noted that the IM&T manager may well be inclined to be more positive about the CIS because of their professional interest in it being a success.

Trust B: Measure of System Effectiveness

Informants in Trust B varied in their views regarding the level of system effectiveness they thought their CIS was achieving and individual scores ranged from a negative 1.3 (clinical manager) to a positive 4.2 (IM&T manager). Both the IM&T manager and the manager indicated that they felt the system was reasonably sound in its technical capabilities and functionality and in the value of the reports produced from the system. They both indicated that they thought management information needs were being satisfied by the CIS and that generally management like the system, although they were less sure that the CIS had improved the performance of the Trust or its functional output.

In contrast, the clinical manager and the clinical user were generally negative about the system. They indicated that they felt neither management nor user information requirements were satisfied and that neither group used the information available

from the CIS with any regularity in their work. There were doubts expressed over the reliability of the information on the system in terms of accuracy, timeliness or relevance. However, only the clinical manager felt that the system had been poor in its technical capabilities and functionality and that the information from the CIS had definitely not improved the performance of the Trust. The clinical user indicated that she felt users were more indifferent towards the CIS rather than actively disliking it although the clinical manager believed users were generally negative towards the system.

The only question where all the informants were consistent was that users had not used the CIS greatly to get information to help with their work activities. This result is interesting as it supports the majority view that user ownership was not developing in the Trust at the time of the interviews. It also implies that the IM&T manager may have been overstating the existence of user ownership within the Trust during the interview. It should also be noted that the clinical manager scored the CIS particularly badly and the IM&T manager scored the CIS particularly high. The high scores provided by the IM&T manager are not necessarily surprising as they may well have a vested interest in the system being perceived as successful. However, the low scores provided by the clinical manager should also be treated with some caution especially as the remaining informants provided a greater spread of scores. These results imply that the clinical manager may have been excessively negative about the system. Consequently, the overall success score of 2.6 may give a slightly more negative measure of the performance of the system than is actually the case.

6.5.3 Trust C: Within Case Results

Trust C: Organisational Background

Trust C was granted Trust status in April 1993 and serves a population of approximately 300,000. The Trust provides Community, Acute and Mental Health Services and operates two Community Hospitals providing health care for the elderly and one Acute Hospital. A range of professional groups are employed at the Trust including: District Nurses; Health Visitors; School Nurses; a full range of PAM Services; Community Psychiatric Nurses; Clinical Psychologists; and Services for

People with Learning Disabilities. The District Nurses and Health Visitors compose the largest staff group and they also represent the largest group using the CIS.

The Trust had not been operating a computerised Trust wide information system for community staff prior to the implementation of the CIS and relied on a series of stand-alone systems and paper based recording methods for its data collection and generating reports. The decision to purchase a CIS was taken in 1995 to prepare for the expected arrival of the new mandatory Community Minimum Data Set. The main drivers behind purchasing an information system apart from the need to provide central returns was to enable staff to monitor clinical activity in order to improve their clinical effectiveness and inform clinical practice, to allow the sharing of information between professional groups and to fulfil the information requirements of Health Commissioners and GPs.

The package that was chosen as the new CIS was the Comwise System and the system was delivered towards the end of 1995. The system was extensively **tested** (7) prior to the implementation on a test database within the IT Department and was subsequently piloted on several professional groups within one locality of the Trust. The pilot was conducted from January 1996 to January 1997 and following a thorough evaluation the main roll-out of the system began in February 1997. At the time of the interviews it was estimated that the roll-out was two thirds complete and consequently the system should be considered partially implemented.

Both clinical and clerical staff enter data onto the CIS either through palmtop computers that are regularly downloaded or through direct keyboard entry although the majority of staff use palmtop computers. At the time of the interviews approximately 350 community staff were using palmtop computers. Staff receive regular standard reports that are printed off centrally from the system and can also request ad hoc reports by contacting the IT support desk and these are then printed off and sent to staff. Since the interviews a more decentralised approach to report writing has started to be introduced that should allow staff to directly access the CIS from their terminals at health centres and community hospitals, thereby increasing the access to information for both clinical staff and managers.

Trust C: The Implications of Adopting Best Practice

Figure 6.4 clearly shows that the informants in Trust C perceived that there had been high levels of all the best practice variables adopted during the CIS development project and that many of these variables were linked to the success of the CIS.

For example, **senior management commitment and participation** (1) was perceived to have a particularly important role in ensuring that the CIS was viewed as a success. The commitment and participation from senior management has taken the form of providing resources and financial support and it was noted that three Directors of the Trust had been actively involved throughout the project by sitting on Steering Groups and Project Meetings. The provision of financial resources (a) has meant that some clinical staff have been provided with desktop terminals which have had direct benefits. For example, an informant stated:

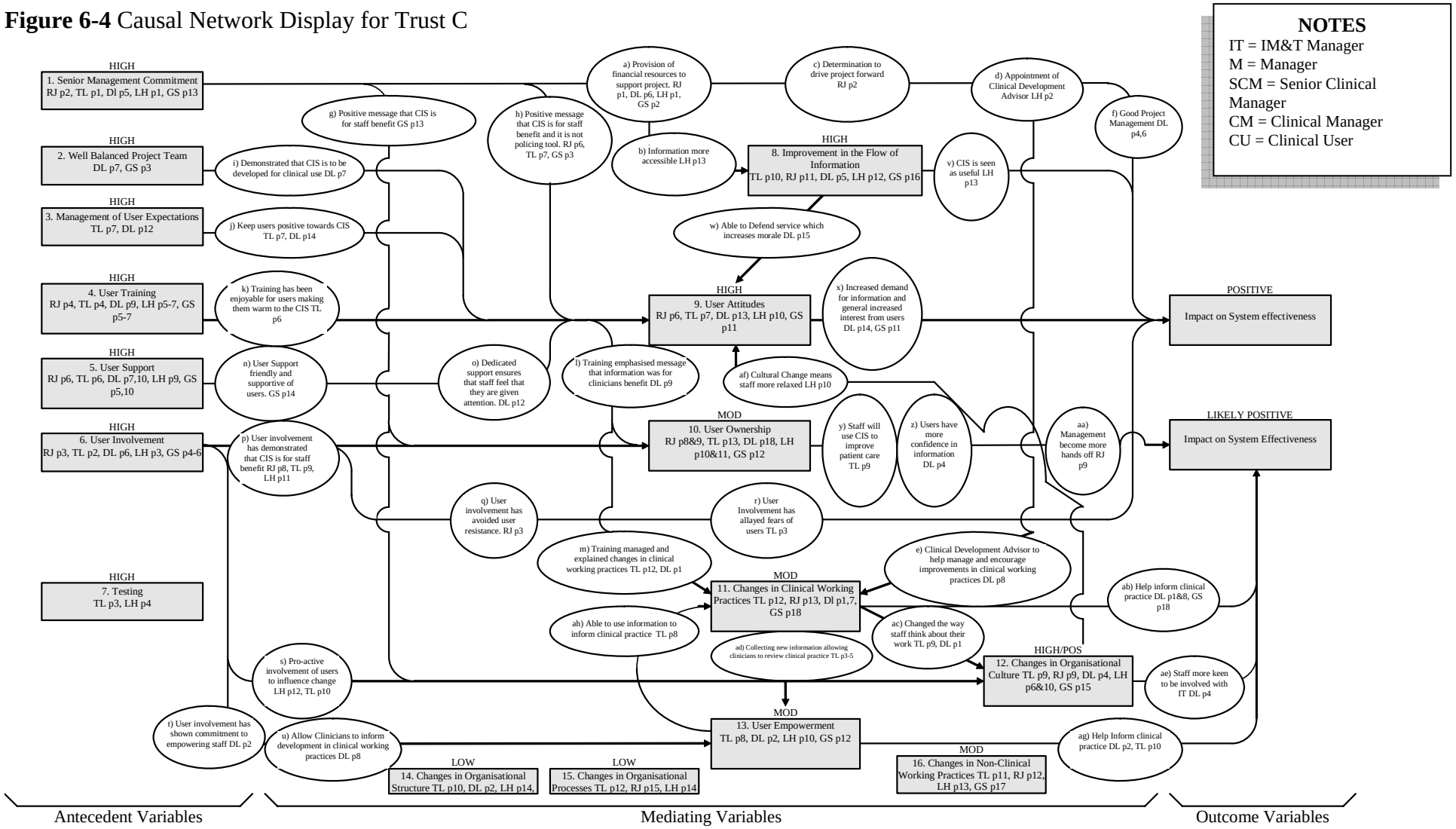
> *'Being able to use your PC and look at things saves so much time. I'm still in my infancy of doing that but it is absolutely wonderful. If a complaint comes in I can actually see who has been involved straight away and it saves so much faffing about.' (clinical manager, C).*

The provision of look up devices, such as the clinical manager's PC has improved the flow of information within the Trust allowing better access to timely information (b) and therefore the manager is in a better position to respond to issues such as complaints. The senior managers have also provided a determination to drive the project forward (c) and have ensured that there has been effective project management employed (f) throughout the development and implementation of the CIS both of which were considered to have direct benefits for the overall effectiveness of the CIS.

In addition, the attitude of senior management provided a strong positive message, that the CIS should be owned by, and is intended to benefit, clinicians (g). This positive message was thought to be helping develop further positive changes in organisational culture, with staff warming to the use of IT and developing user ownership. Furthermore, specific efforts were made by senior management to

emphasise to staff that the CIS was not to be used as a policing tool (h) and these

Figure 6-4 Causal Network Display for Trust C



efforts were encouraging positive user attitudes. The positive message from senior management was reinforced with the appointment of a Clinical Development Advisor whose role was to help manage and encourage developments in clinical working practices. This appointment was perceived to have a direct benefit for the system because it *'demonstrates commitment'* (clinical manager, C) to the clinical development of the system from senior management (d) and it has a positive effect on changes in clinical working practices (e).

The appointment of a Clinical Development Advisor also helped in creating a **well balanced project team** (2). Once the roll-out of the system was underway it was noted by senior management that clinicians felt that the CIS was not achieving the aim of helping to inform clinical practice. Consequently, an advisory post was created and a clinician from the Trust was employed in that role. It was perceived that this appointment had helped develop positive user attitudes towards the CIS (i) because it reinforces the message that '*we are serious about developing the system for clinicians'* (senior clinical manager, C).

The good **management of user expectations** (3) was also considered to have been important. From the outset of the project the aims that were set for the CIS and why it was being implemented were clearly explained to clinicians and a lot of time was spent listening to staff and trying to understand what their reporting requirements were. It was noted that managing and delivering user expectations had been very important in *'keeping the users on board'* (senior clinical manager, C) and developing positive user attitudes (j).

User training (4) was also perceived by informants to be having positive benefits for the CIS project. The training comprised three sessions; an introduction to the CIS and the palmtop following which staff were allowed to take the palmtops away to familiarise themselves with them; a concepts training session that explained the new care objectives and care programmes approach to working and how these changes would affect clinicians day to day working; and operational training that explained the practicalities of entering data onto the CIS and downloading. Additional training was also made available should any staff require it and follow up sessions were provided

to keep staff informed of further developments with the system during its operation.

The **user support** (5) was closely linked to the training and three professional lead roles were created covering the disciplines of District Nursing, Health Visiting and School Nurses to answer any professional queries that staff had either during the training or once staff were using the system in the field. Other support elements consisted of a help desk based in the IT Department and a manual specifically designed to support clinical staff in the Trust.

Both the style and volume of training and support were well received by the users and generally they were considered to be having positive effects on the project as a whole. For example, the IM&T manager indicated that the training had been enjoyable for users (k) and had helped develop positive user attitudes. He stated:

> *'I think that the training has definitely had a favourable response from the users and I think that it has been an enjoyable experience for them because of the characters that we have got in there. I think that the training and support has on the whole made users warm to the system' (IM&T manager, C).*

Similarly, it was noted that the attitude of the staff who provided the user support was very friendly, positive and reassuring (n) and that had helped generate positive attitudes from the users towards the system. Furthermore, the support was also considered by one informant as being very important to maintain the momentum of the project and to ensure that users continually feel that they are being listened to and the problems that they are identifying in the system are being acted on (o).

The **user training** (4) was also considered to be having an important role in developing user ownership (10) and supporting the changes in clinical working practices (11). The manner in which the training was presented meant that there was a consistent message that the information that was being collected by the CIS was to be for clinicians' own use (l). The trainers made a considerable effort to emphasise to users that they would be having ownership of the data and so had a vested interest in the system and the data it collected. Closely linked to the issue of ownership was the

introduction of the new working practices and in this respect the 'concepts' element of the training was considered vital (m) in order to allow a smooth transition from the old approach to delivering care to the new style that focused much more on packages of care and care aims. The training emphasised that the system would support and facilitate these changes in working practices because of the new data that was being collected and would allow clinical staff to further develop the system by reviewing their current working practices and assessing their own effectiveness in the delivery of patient care.

There have been high levels of **user involvement** (6) at Trust C and this involvement took a variety of forms. It was stated that the users had been involved at the outset of the project through a series of awareness sessions about the CIS, helping to develop and review the statement of need for the CIS and in the selection of the precise system. A variety of meeting groups and advisory groups had been set up to advise and discuss professional issues, future developments in the system and any other issues that arose during the operation of the system and these groups generally met on a monthly or 6 week basis.

These high levels of user involvement were thought to have a number of significant impacts on the systems development project. The direct positive impacts of user involvement on system effectiveness were considered to be through avoiding user resistance (q) and allaying the fears of users about the system (r). User involvement was also considered particularly important in giving the users a sense of ownership over the system by demonstrating that the users are having some influence over decisions that are made regarding the system and that the system will be for their benefit (p). For example, informants, in response to a question asking for details of the methods used to develop ownership, made the following comments:

> *'I think by consultation, by user involvement, by listening to what they [clinicians] say and trying to act on that where we can, I believe that not only empowers them to say what they are doing but actually demonstrates that it is their system. That is encouraged as part of the training, you know, the information is yours.' (clinical manager, C),*

> *'Involvement and they were involved at every point so you couldn't be able to say that it was an IT person who chose the system. They were involved in choosing it.' (IM&T manager, C),*

> *'Again involvement. Membership of the Project Board; the setting up of the Project Assurance Team; the involvement of the clinical service holders, all those sort of things. The involvement of the staff themselves, the Organisational Development Advisor's detailed work with the staff to get them involved with the system has been a major theme throughout the project.' (manager, C).*

In addition, user involvement was also seen as a facilitator to help develop a positive change in organisational culture (12) with more attention being given by managers to user views and generally trying to encourage users to become more involved in IT developments within the Trust, (s) such as the introduction of the CIS. The involvement of users in this respect was also thought to be helping develop empowerment (13), demonstrating that users are expected to be making their own decisions about how the system and the information from the system is used (t) and in particular, how the new information may be used to improve clinical staffs' own working practices (u).

Trust C: Level of Organisational Impact

Figure 6.4 shows that the organisational impact engendered by the development, implementation and operation of the CIS at Trust C has been mixed. Informants reported changes in some areas but no impact in others. One area that exhibited a high impact was the **flow of information** (8) at the Trust. It was thought that there had been considerable positive changes in the flow of information since the implementation of the CIS with significant reductions in the manual collection of data and paperwork and that these changes had been planned. The executive information that was now available was considered to be more accurate and the process of getting standard reports for both management and clinicians has been made a lot simpler and easier. Consequently, the CIS is perceived by many staff to be performing a useful role (v) and this is thought to be having a positive impact on the system's effectiveness.

The positive change in the **flow of information** (8) is also thought to be having a positive impact on **user attitudes** (9). The introduction of the system has meant that new data are entered on activities that have traditionally not been recorded, although they formed a considerable part of clinical staff's working day. For example, data are now collected on telephone calls and case conferences and it is thought that this new data collection has reassured staff and increased morale. Clinical staff perceive that management can now see the full picture of a clinician's working day and therefore have a greater understanding of the daily pressures and constraints. It is likely that clinical staff also feel that they are in a stronger position to defend their service (w) because the increase in the depth of data detail that is being recorded means that the use of resources can be more easily explained and justified.

There have been moderate changes in **clinical working practices** (11) in Trust C. The decision to change the existing clinical working practices by introducing packages of care and care aims was made prior to the implementation of the CIS and these changes were planned. Consequently, clinical staff are now working in a different way in terms of how they think about their work, focusing more on the outcome of interventions rather than simply delivering care to patients. There have also been simple practical differences in the professional/patient interaction because the health care professional now has a palmtop computer to use during the interaction which means that staff have to adopt a different working style. However, these changes in working practices were only considered to be moderate at the time of the interviews because the system was partially implemented and not all staff groups had access to the CIS. Consequently, the full benefits for clinical staff such as informing clinical practice and communicating between different professional groups to allow a more co-ordinated delivery of care, will only be realised once all staff are using the system. A clinical user commented:

> *'It is only when everybody is using the information technology properly that we will be able to utilise the data and influence the way we work and the way we provide care.' (clinical user, C)*

These changes in clinical working practices are perceived to be having several

impacts. Primarily, the changes are thought to be having a positive impact on the effectiveness of the CIS as the configuration of the system supports the new style of working and will enable staff to review their performance and improve and inform their clinical practice (ab). Further impacts are expected in terms of the Trust's organisational culture because clinical staff will have altered the way in which they think about their work, moving away from *'gut feel management'* (IM&T manager, C) to an approach that is based on reliable data, and in so doing allowing staff to test their beliefs concerning the delivery of care (ac). Consequently, these changes in working practices are expected to help develop a greater use and reliance on information and thereby create an information culture within the Trust.

A further impact that was identified by informants resulting from the changes in clinical working practices was greater empowerment for users. It was thought that the adoption of the new packages of care approach will result in the collection of new data in a manner that will enable clinicians to review their clinical practice more effectively (ad). This ability to review clinical practice is expected to foster a greater sense of empowerment among the clinicians and will lead to further improvements in working practices because of an increased ability to inform clinical practice (ah).

Changes in **non-clinical working practices** (16) have been largely practical supporting the clinical changes. For example, the changes in non-clinical working practices include staff having to: upload and download their palmtops on a regular basis; make greater use of desktop computers; and adjust to a new way of claiming travelling expenses. In other respects, it was noted by one clinician that they now use information technology in general a lot more since the introduction of the CIS. This is largely because operating the CIS has required the investment in desktop computers in many health centres. Consequently, clinical staff have greater access to other software packages that are on the computer such as email and word-processing that has facilitated better and more efficient communications within the Trust. However, these changes in non-clinical working practices, although significant, were not considered by any informants to be influencing any other issues associated with the CIS or the perceived effectiveness of the system.

With regard to **user empowerment** (13), it was considered by informants that there had been moderate improvements since the implementation of the CIS and that these changes had been planned. The ability to have immediate access to patient based information was considered by the IM&T manager to be facilitating the development of some empowerment and a senior clinical manager also thought that some clinicians in a Team Leader role, were experiencing a greater sense of empowerment, these clinicians demanding more reports to enable them to develop their caseload management. However, it was also clearly identified that informants felt that the Trust was very much in the early stages of developing user empowerment and that it was expected in the future. It was expected that these higher levels of empowerment would have an increased positive influence on the perceived effectiveness of the CIS by allowing clinicians personal control in the development of their clinical practice (ag) and help to inform and improve clinical working practices (ah).

There were more significant changes noted by informants with respect to **organisational culture** (12) and these planned changes took three distinct forms. The most significant change is the development of an information culture. A manager stated that, *'as an organisation I think we are becoming more used to managing with data'* indicating that the use of information to inform management decisions was more commonplace. This view was also supported by a clinical manager (C) with respect to clinical staff commenting,

> *'we have tried to say, this is a system to help you [clinicians], it's not there to change what you do unless you decide to make a change based on the information you have collected, and that is the cultural change that we are trying to make.'*

The second change is that staff are generally more interested in information technology and are keen to be involved both with the CIS and other developments within the Trust. Consequently, it was thought that there was an IT awareness developing throughout the Trust with the IM&T manager (C) commenting that,

> *'I think they [clinicians] have become more IT aware which has encouraged*

them to get involved with other IT developments.'

Finally, the third change in organisational culture is more attitudinal with a more relaxed atmosphere and less evidence of a blame culture. Staff and management are making efforts to be more positive in their work, praising good effort rather than criticising mistakes.

Overall it is thought that these changes in organisational culture have had a positive effect on the overall effectiveness of the CIS. A senior clinical manager identified that the greater awareness about information technology has helped in motivating staff to think more positively and constructively about the CIS and what it can achieve for them (ae). In addition, the reduction in a blame culture is also thought to be closely linked to the development of positive user attitudes towards the CIS, the two impacts developing simultaneously (af).

In terms of both **organisational structure** (14) and **organisational processes** (15) the informants all agreed that there had been little change as a result of the implementation of the CIS. In terms of organisational structure it was stated that some staff had experienced changes in their roles but that these changes were absorbed into existing practices. Otherwise it was considered that there had been little change in organisational structure and that this was largely because the CIS had not been intended to generate such changes. However, although there had been little change in organisational processes at the time of the interviews this was expected to change in the future. These changes were expected to be manifested in the integration of the CIS to the other information systems within the Trust to allow a more holistic view of the care delivery process and allow a review of the organisational processes taking place. Further changes were expected through utilising the information from the CIS but no specific example could be cited by informants. However, the precursor for all these changes in organisational processes was for the CIS to be fully implemented and until that was achieved the informants did not expect to see any change in organisational processes.

Trust C: User Attitudes and User Ownership

There was an agreement among informants at Trust C that **user attitudes** (9) had improved since the implementation of the CIS. It was noted by informants that the users had become less fearful of the CIS and were developing more confidence in using the system and requesting reports. Users were making more positive comments about the system during meetings and this positive attitude has been supported by the results of a recent evaluation of the roll-out.

Developing positive user attitudes was considered to have a direct positive impact on the overall perceived effectiveness of the CIS with users demanding more information from the CIS and having a greater interest in using information (x). For example, a clinical user in a Team Leader role stated:

> *'I think in terms of report writing, people are coming and saying, "can I get this information?" "How is this done?" That is the best news, that they [clinicians] are taking it seriously and thinking that they may be able to do something with it' (clinical user, C).*

It was felt by informants that the interest in the information that the CIS could provide would result in the system being perceived as being more effective than the previous paper based systems. The CIS has provided clinicians with useful information in return for entering the data, whereas before the clinicians felt that they were entering data into a 'black hole'.

In contrast, informants generally felt that **user ownership** (10) had not fully developed in Trust C at the time of the interviews although it was expected to increase in the future. It was stated that developing user ownership had been planned during the systems development project and that it was starting to occur at moderate levels especially among clinical Team Leaders. However, it was noted by a senior clinical manager that it had been more difficult to develop ownership by the front line clinicians who have no immediate managerial responsibility. She stated:

> *'I had one comment from one of the Project pilot staff that said, "I can see the*

value of it for a Team leader, but what does it mean to me, a staff Nurse, going to a patient today, to give him an enema?" I think we have got to try and work harder to get the message through that the CIS will be valuable to clinicians too' (senior clinical manager, C).

It was identified by a clinical manager that one of the difficulties in getting clinical staff to own the system had been the relatively slow return of information, commenting,

'I don't think until they get information back for themselves regularly, they will have complete ownership' (clinical manager, C).

Furthermore, a manager noted that the fact that the system was still only partially implemented had also inhibited the development of user ownership although he indicated that ownership was expected to be less of a problem once the system was fully operational.

As a result of only moderate levels of user ownership being observed at Trust C informants tended to discuss the impacts of developing ownership in the future tense. Several impacts were expected, all influencing the overall perceived effectiveness of the CIS. The first of these impacts was that clinical staff would make use of the system to improve patient care (y). The IM&T manager (C) stated that,

'I think that once they own it they will try and optimise its use and they will try and explore different ways in which the system can be used to improve the service.'

Secondly, a senior clinical manager thought that once the users have a sense of ownership over the data they will have greater confidence in the information that is provided by the CIS (z). She noted that,

'I think people will feel more confident about the information. I think in the past we have felt that it has not been a true reflection of the work that has been

undertaken' (senior clinical manager, C).

Consequently, the clinicians should feel that the CIS is helping them justify their workloads and providing managers with a better understanding of the day to day pressures that the clinicians are experiencing.

Finally, the third impact that was expected once user ownership had been achieved was that management could become more 'hands off' in terms of encouraging staff to make use of the system to its full potential (aa). A manager thought that when the users feel that they own the system, the management role would then be to provide support and resources to facilitate the day to day use of the CIS. The clinicians will be inclined to use the system for their own benefit rather than senior management having to encourage and motivate staff to look at the CIS and convince them that there are benefits to be derived from having the system.

Trust C: Measure of System Effectiveness

The CIS was perceived to be reasonably effective by informants at Trust C. The CIS was considered to be performing well in terms of its technical capabilities and functionality and the reports produced have been accurate, relevant and timely. Consequently, management were thought to have made reasonably high use of the CIS to get information for their management activities and that management liked the system.

In contrast, it was reported that users had yet to make significant use of information from the CIS for their work activities and consequently their information needs had not been adequately satisfied. These results correspond with the limited development of user ownership among the users identified at the Trust. However, it was thought by all informants that users generally liked the system and that the CIS may be starting to help improve the performance and the functional output of the Trust.

It is interesting to note that the informants have all provided similar responses to the performance instrument that suggests that there is a consistent view of the performance of the CIS from all hierarchical perspectives within Trust C. The areas

where the CIS performs less well, such as users making use of the system for their work activities, can be explained by the fact that the CIS was only partially implemented when the performance measure was conducted. The overall performance score derived for Trust C is 3.2 indicating that the CIS is performing to average levels of success, although the informants expected this level of performance to rise in the future.

6.5.4 Trust D: Within Case Results

Trust D: Organisational Background

Trust D is a combined Trust providing Community, Acute and Mental Health Services. The Acute service is generally viewed as the main priority of the Trust. The Trust employ a variety of professional groups including: District Nurses; Health Visitors; School Age Nurses; a full range of PAMS; Community Psychiatric Nurses; and Services for Adults with Learning Difficulties. The Trust operates four hospitals that provide Rehabilitative, Mental Illness and Learning Disability Services and one District General Hospital that provides Acute Services. Of these services the District Nurses and Health Visitors compose the largest staff group and are also the largest staff group using the CIS.

Trust D has had a CIS since the late 1980's, operating the Comway 2000 package from Systems Team plc. The decision to upgrade the system was taken in 1996 and the main driver for the upgrade was to fulfil the information requirements of Health Commissioners and GPs. Other significant drivers behind the new CIS were to provide information for management purposes from data generated by the care delivery process and enabling clinical staff to monitor their activity in order to improve their clinical effectiveness.

The upgrade that was chosen was the Comwise community module, also from Systems Team plc. Palmtop computers had been introduced to the Trust in November 1993 to improve the speed and accuracy of the data entered on the Comway 2000 system. The palmtops were piloted on 20 staff in two groups and following a successful evaluation the palmtops were introduced by professional group across the

Trust. When the system was upgraded, all the palm tops were recalled to a central point where they were reinitialised and returned to staff. This process took about a week to complete.

Prior to the upgrade the new system was **tested** (1) on an in-house test database but it was not possible to carry out a pilot of the system or run the two systems in parallel because of a lack of resources. Consequently, once the palmtops had been reinitialised the whole system went live. The informants did not indicate that this approach had led to any major problems in the running of the system and believed that there had been adequate testing of the system. It was also considered that the system was fully implemented at the time of the interviews.

As has been indicated clinical staff enter data onto the CIS using palmtops that are downloaded at least once every seven days. The Trust has approximately 400 users of the CIS and standard reports are produced centrally from the Information Department and sent out to staff. The amount of information that is returned to clinical staff varies between the professional groups and it was noted that the District Nurses receive relatively little information. However, it was stated that this low return of information merely reflected the low levels of demand that had come from the Nurses and, when requested, ad hoc reports can be pulled off the system quite easily.

An Executive Information System (EIS) is also in operation within the Trust and data can be extracted from the CIS to allow managers the ability to generate their own reports. However, although the informants stated that the Information Department had pushed the EIS and attempted to encourage its use, it was still relatively under-utilised, especially with regard to community services. It was also stated that there were no plans to develop the use of the CIS and since the interviews it has been indicated that this lack of interest in the CIS has become more severe, with the option of dispensing with the system and returning to manual data collection being considered.

Trust D: The Implications of Adopting Best Practice

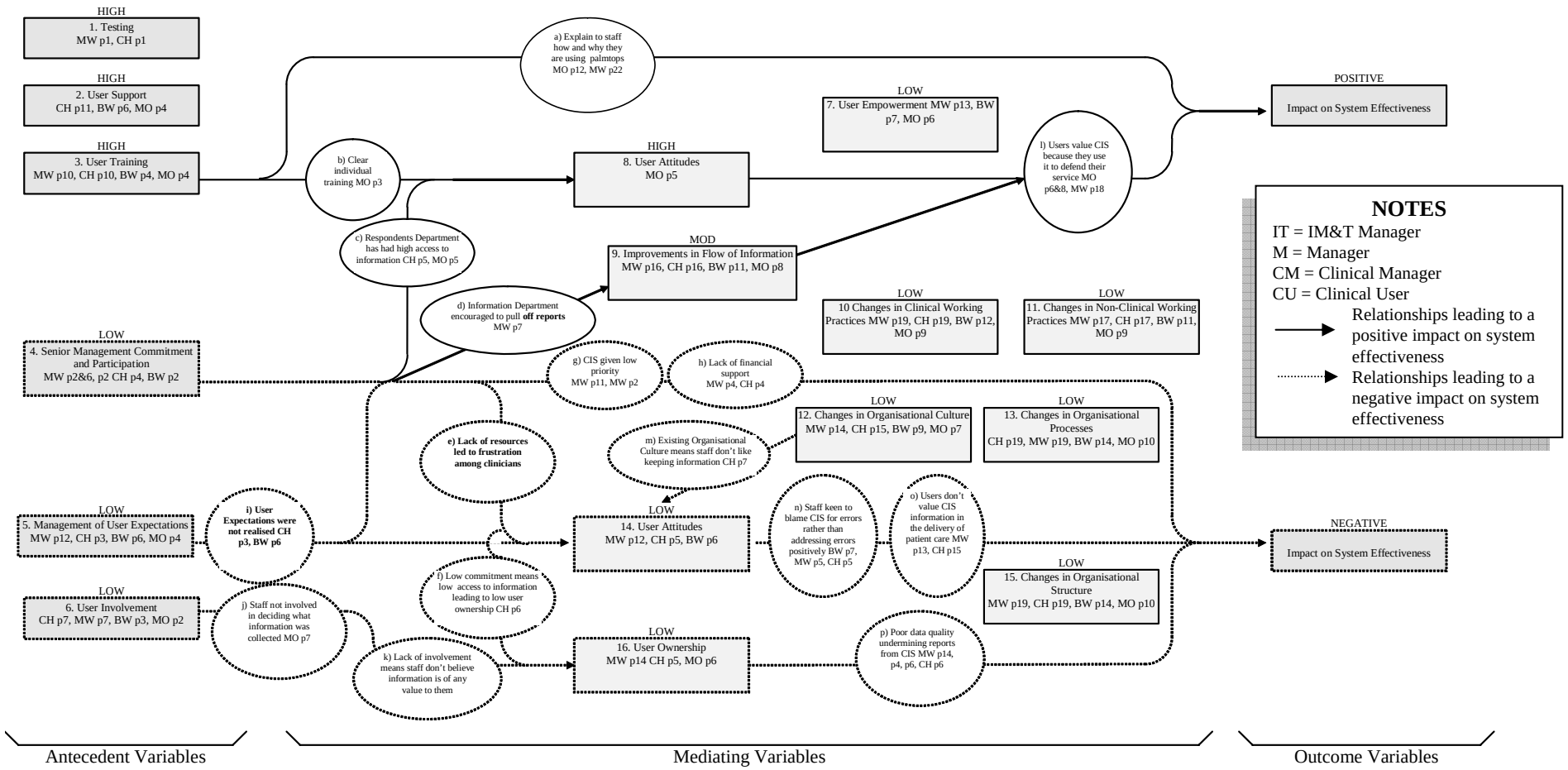
It can been seen from Figure 6.5 that the experience of adopting best practice

variables at Trust D has been mixed. Informants indicated that where there had been high levels of adoption of the best practice variables then they had either a direct or indirect positive impact on the effectiveness of the CIS. In contrast, where there has been low adoption of best practice variables then these were thought to have led to negative impacts on the overall perceived effectiveness of the CIS. One positive area, in terms of the adoption of best practice, was user training.

The **user training** (2) at Trust D for the palmtop computers was conducted in small professional groups of about 4-5 staff either in the Information Department or at health centres. During the training the users used their own patient data so the training would be that much more familiar. The staff were used to collecting the data for the paper-based systems so the training for the palmtops only covered the operation of the system. Similar practical training was also provided for staff for the upgrade of the CIS to the Comwise package. There has not been any follow up training since the implementation of the upgrade, however, additional training has been provided for any new staff joining the Trust, usually on a one to one basis.

It was indicated by the IM&T manager that the training had been crucial for those staff who were using palmtop computers to enter the data because of the decentralised nature of the community practitioners work (a). The clinician is frequently working within patients' homes and is not in a position to request help with using the palmtop until they return to base, so consequently the staff need to be confident that they know how to use the system before they use it in their work. A clinical user also felt that the training had been good and was particularly effective when it had been provided on a one to one basis (b). In addition, the trainer had a very approachable manner and made herself available to support any teething problems that staff had in the first weeks of using the system that helped in reassuring staff and developing positive user attitudes. However, it was also noted by the clinical user that it would have been helpful if during the training, more emphasis had been given to the benefits and information that the CIS could provide for clinical staff.

Figure 6-5 Causal Network Display for Trust D



The **support** (3) that was provided for users once they started using the CIS took the form of a help line. The support desk provided help with any worries or difficulties that the staff experienced when using the CIS, such as downloading and was considered to be adequate by the informants. However, apart from being necessary to support the implementation of palmtops and the upgrade, no specific links were identified between the provision of user support and other issues associated with the CIS.

The most common factor that was referred to by informants as influencing the effectiveness of the CIS was the low level of **senior management commitment and participation** (4). It was noted by the IM&T manager that senior management support for the system had dwindled since the palmtops had been introduced and that there had been low levels of investment in both human resources and hardware to support the CIS. It was felt by informants that the community element of the Trust was, in all respects, viewed as the poor relation to the acute services and it was indicated during a follow up phone call that it was now expected that the emerging Primary Care Groups in the local area of Trust D would take over responsibility for the provision of the community services. Consequently, there is now even less senior management commitment for the CIS than there was at the time of the interviews and this has been manifested by a severe reluctance from senior management to provide the resources to modify the system and make it Year 2000 compliant.

It was felt by the IM&T manager that the low senior management commitment and participation had led to a low priority being associated with the CIS that in turn had a direct negative impact on the overall perceived effectiveness of the CIS. There was a general feeling of disinterest towards the system in the Trust with it being viewed as a 'problem system'. This negative impact has been further compounded by a lack of financial resources to support the operation of the CIS and replace old hardware. For example, it was stated that the palmtop computers that the Clinicians were using were generally in a poor state of repair and needed replacing. It was stated by the IT support manager (D) that

'The problems would be a lot less if the money was put in and we got new

palmtops with a new supply of batteries. We have no money to repair the palmtops and so it is very demoralising.'

The lack of support from senior management has also had negative implications for the development of positive user attitudes and user ownership. The IM&T manager indicated that clinicians were becoming frustrated with the lack of finances to fulfil the systems potential (e). He stated that:

'The user group is frustrated by the lack of money being put into the system to run it properly and to get the data out. They would like to take it further but there is no commitment from the financial side which is a result of a lack of senior management interest.' (IM&T manager, D).

This lack of interest and commitment from senior managers is thought to be contributing to negative user attitudes towards the CIS and a general sense of apathy towards the system. Similarly, it was argued that the lack of resources had resulted in fewer desktop computers being provided at health centres for clinical staff to use, reducing the ability of staff to access information. This lack of information for clinical staff was thought to be inhibiting the development of user ownership in the Trust (f) because the users could not review their practices or assess their clinical performance.

However, it is interesting to note that there have been some attempts to return information to clinical staff. A clinical user stated that for his Department (Physiotherapy) they had received a lot of information from the CIS and that this had been useful. The Physiotherapists had been asking for a lot of information at the time because they were considering a change in their service configuration. The clinical user felt that because this information was being sent to the Department and the clinical staff were seeing printouts and reports showing their activity (c), then this information seemed to help develop positive user attitudes (8).

The experience of the Physiotherapists was also cited as a positive example by the IM&T manager, however he continued to qualify that experience by stating that this positive use of information was not occurring for the District Nurses and Health

Visitors because of a lack of interest. The IM&T manager agreed that they had made attempts to return quite a lot of reports to staff who were interested in using the information (d) and in these cases there had been an improvement in the flow of information (9) but concluded that central information provision had suffered because of a lack of ongoing resources from senior management. Consequently, it would appear that there have been some pockets of success across the Trust where information from the CIS has been used effectively resulting in positive user attitudes. However, it was stated that whether the information was used or not depended very much on the importance placed on it by managers and that some of the largest staff groups were receiving little benefit from the system and generally had a low opinion of the CIS.

It was also identified by all the informants that there had been poor **management of user expectations** (5) since the upgrade of the system. The main impact of not managing user expectations has been on user attitudes. The users were told that once the system was upgraded they would have greater access to information to inform clinical practice. However, this new information provision was not delivered due to staff shortages in the Information Department resulting in user expectations not being realised (i). The IT Support manager stated that failing to deliver to user expectations had led to *'very blasé attitude from the users'*.

Finally, it was also noted by informants that there had been very little **user involvement** (6) with regard to the CIS. Users were not involved in deciding which system was chosen to be CIS for the Trust or in the design of the training. There is a user group that meets once every two months although an informant stated:

> *'The user group doesn't work particularly well. It's quite difficult for the District Nurses and Health Visitor's to feed back to everyone because there are so many of them and they are community based so they are all over the place' (IM&T manager, D).*

The clinical user also indicated that there had been little user involvement, stating:

> *'The only stage would be the final stage, the use of the system. As regards whether anybody with a higher level than me was actually involved, I certainly haven't been aware of it, so the only involvement has been in the actual operation of the system.' (clinical user, D).*

It is interesting to note that the IM&T manager did not associate a great level of importance with involving the users during the development and use of the CIS. When asked what areas he thought would have suffered had there not been any user involvement with the CIS he replied:

> *'Not a great deal I don't think. The system itself is like an off the shelf system, it's not designed for us, so really you get the system, you implement it and there are not many decisions you can make on the road really' (IM&T manager, D).*

This is in contrast to two informants who felt that having low levels of user involvement had resulted in poor levels of user ownership (16) in the Trust. A clinical user stated that they were not involved in deciding what data the CIS should be recording or could record for clinicians' benefit (j) and this had inhibited a sense of ownership over the data from clinicians. In addition, the IT Support manager indicated that although there was some involvement in initially developing the coding structure of the CIS there had been no on-going consultation with users to reflect changes in care practices or to update how data are collected. This lack of ongoing consultation has resulted in users feeling that the information provided by the CIS is not directly relevant to them (k) and therefore reduces the sense of ownership that staff feel towards the system.

Trust D: Level of Organisational Impact

In studying Figure 6.5 it can be seen that there has been very little organisational impact that is perceived to have resulted from the introduction of a CIS at Trust D. Informants could not identify any changes in **user empowerment** (7), **organisational processes** (13) or **organisational structure** (15). There have only been very minor changes in **clinical working practices** (10) with a faster turnover of patients and a greater ability to monitor a Service's performance against its contract requirements

(clinical user, D). **Non-clinical working practices** (11) have also experienced a slight change, because of downloading requirements and staff having the flexibility to input the data onto the palmtops when they like.

Similarly, informants felt that there has been little change in the **organisational culture** (12) of the Trust and that the clinicians' culture is such that they focus completely on the delivery of care to the patient with electronic data recording considered a very low priority. It was felt that there was a complete lack of an information culture and that there was a general atmosphere of disinterest towards information technology developments. The IT Support manager identified the current organisational culture as directly influencing users attitudes towards the CIS. She stated that because the clinicians disliked recording and keeping information they also had strong negative attitudes towards the CIS, seeing it as an intrusion into their delivery of care (m).

The only impact that was noted as result of the CIS was a moderate positive change in the **flow of information** (9) in the Trust. The provision of standard reports that were generated centrally was thought to be helping managers work more effectively and efficiently and it was noted by a clinical user that the relationship between their Department (Physiotherapy) and the Contracts and Incomes Department had improved because dialogue was now based on the CIS data collection. This improved relationship was thought to be contributing to a positive impact on the perceived effectiveness of the CIS because the clinicians are able to use to the information from the CIS to help defend their service and justify extra resources (l). Consequently, when these circumstances occur, the CIS is seen as having some value to clinicians although it should be emphasised that examples such as this were not thought to be commonplace across the Trust.

Trust D: User attitudes and User Ownership

The majority of informants thought that there were **negative user attitudes** (14) towards the CIS at Trust D. For example, a manager stated that the users appeared to be very keen to 'knock' the system at every opportunity (n) rather than addressing problems more positively and this was supported by both the IM&T manager and the

IT Support manager. All these informants indicated that they felt negative user attitudes were reducing the perceived effectiveness of the CIS. The IM&T manager commented that they had attempted to develop more positive user attitudes and conducted a series of road shows to try and publicise the potential of the system and the information that could be retrieved from it. However, he confessed that these road shows had not been particularly successful with a poor attendance from the clinical staff and stated that the attitude of staff was still one of disinterest, users not associating any value with the CIS information (o). This impression was supported by the IT Support manager who stated:

> *'The importance of the information hasn't filtered down to the users because the users have never had to work with information or anything like that.' (IT support manager, D).*

This quote indicates that there may also be a wider issue inhibiting the use of information technology in community healthcare. It suggests that staff are not used to working with information and do not instinctively look to make use of available information to inform their practice. This lack of an information culture within the NHS was noted as a particular problem in the recent IM&T Strategy, which emphasises the need to change clinicians' views towards the use of information and information technology (Burns, 1998).

However, one informant did indicate that there were **positive user attitudes** (8) towards the CIS in some areas of the Trust. The clinical user stated that in his Department (Physiotherapy) the users have not questioned the collection of data in the last 3 years because they understood its value. There is now a greater demand to see the information that is generated from the CIS. He commented:

> *'We get people asking whether the report for this quarter is out yet so that they can compare what they have done to previous quarters' (clinical user, D).*

In addition, the clinical user stated that the system had provided information that had been used to justify the declared levels of activity in his service, thereby ensuring that

staff were not over-committed. This ability to justify resources (l) was thought to be helping provide users with greater cause to value and use the CIS.

The informants were more consistent in their views towards the development of **user ownership** (16). Although it was stated that there had been an intention to develop user ownership it was generally thought that it had not occurred at the Trust. The IM&T manager believed that the development of user ownership was closely linked to the poor data quality of the CIS (p). He stated that the main problem was that the users were not interested in entering data onto the CIS. This lack of interest increases the likelihood of inaccuracies in the data and poor data quality. The poor data quality then serves to compound the lack of interest in the system because the reports that are pulled off the system are suspected to be inaccurate. Consequently, a downward cycle is occurring in terms of data quality and user ownership both of which are thought to be having a negative effect on the perceived system effectiveness. It was also expected that low user ownership was likely to continue in the future because there were no plans to provide the resources to improve the data quality of the system or to encourage users to enter their data more accurately.

Trust D: Measure of System Effectiveness

The results from the performance questionnaire seem to indicate that the CIS is performing moderately well. Generally, informants felt that the CIS was functioning effectively with no significant technical problems and that the reports that were generated from the system were perceived to be accurate, timely and relevant. This result seems to contradict the comments made by the IM&T manager about the problems of data quality and user ownership. However, this contradiction can be explained when it is considered that generally the data quality has improved since the implementation of the CIS in comparison with the previous, paper based systems. Consequently, although there may be some doubts over the quality of the data on the system, it would appear that the majority of staff consider the figures to be accurate enough to form the basis for making decisions. Indeed, it may simply be a case of an alternative source of information not being available to staff, so they have no choice over the information that they use.

It was also thought by the informants that the managers have made use of the information on the CIS for their work activities and that management information needs are generally satisfied by the system. It was interesting to note however, that despite management making use of the system, it was perceived by informants that the managers still did not like the system. This result corresponds with the low levels of senior management commitment associated with the CIS that were identified in the previous sections.

However, the responses to users' information needs were more varied. The majority of informants indicated that they thought the CIS was not being used by clinicians for their work activities and that their information needs were not being satisfied. In contrast, the clinical user stated that in his department, clinicians' information needs are being satisfied by the system and that staff like the system.

The results from the performance instrument also indicated that the majority of informants thought that the CIS had improved the performance of the Trust to some extent. Similar results were also recorded regarding the functional output of the Trust, informants generally indicating that there had been some improvement.

Looking at the pattern of responses from the informants it can be seen that the clinical user tends to be more positive about the CIS than any other informant. These results were expected and the previous sections have shown that the clinical user's experience is considerably more positive than that of the other informants. However, comments from all the other informants suggested that the clinical user's positive experience of the CIS may be less common among clinical users in other professional groups, such as District Nurses and Health Visitors. The overall impression given by informants about the CIS is that it was, at most, performing to average levels of effectiveness. However, the overall success score (3.4) generated for Trust D indicates a higher level of effectiveness than would be expected. Consequently, it is suggested that the clinical user's positive responses to the questionnaire may be skewing the overall success measure making it overly positive, rather than giving a true indication of the performance of the system.

6.5.5 Trust E: Within Case Results

Trust E: Organisational Background

Trust E provides mainly Community and Mental Health Services and operates two Community Hospitals and three Cottage Hospitals. The Trust employs a range of staff groups including: District Nurses; Health Visitors; School Health Nurses; several PAM Services; Community Psychiatric Nurses; Clinical Psychologists; and Services for People with Learning Difficulties. The District Nurses and Health Visitors compose the largest staff groups and are also the largest groups that provide data to be entered onto the CIS.

The Trust had been using a CIS since the late 1980's called FIP that recorded data purely for resource allocation and contracting purposes. Due to a number of technical problems and poor data quality associated with FIP the procurement for a new community system was undertaken in April 1994. Additional drivers for updating the system included fulfilling the information requirements of Health Commissioners and GPs and producing cash releasing cost improvements.

The new system that was purchased was the Comwise community module from Systems Team plc and the package was delivered in April 1995. The system was extensively **tested** (1) in-house on a test database to verify coding structures and prepare test reports. The system was piloted on one staff group (Speech and Language Therapy) and once the system was confirmed to be functioning adequately, was rolled out to the whole Trust.

Due to financial considerations the decision was taken not to use palmtop computers to support data entry on the system. As a result, staff have continued to use the same paper based recording methods that had supported the previous system (FIP). The forms were completed by clinical staff and then forwarded to input staff to enter the data directly onto the CIS. The majority of clinical staff therefore have no direct contact with the CIS at any time. The Trust employs about 100 input staff who use the system on a daily basis and there are approximately 1,000 staff in total that act as clinical data sources for the CIS. It was considered that the system was more or less

fully implemented across the Trust at the time of the interviews. It should be noted that for consistency, the clinical staff are referred to as the 'users' in the following discussion as they are considered the main potential users of information from the CIS.

Very little information was returned to the clinical staff although it was stated that few requests had been made of the system. Standard reports are produced for locality managers but there have been few ad hoc requests for additional information. It was indicated by the IM&T manager that the CIS is viewed very much as a resource allocation system within the Trust, designed to support the contracting process and was thought to have little direct value for the clinical staff.

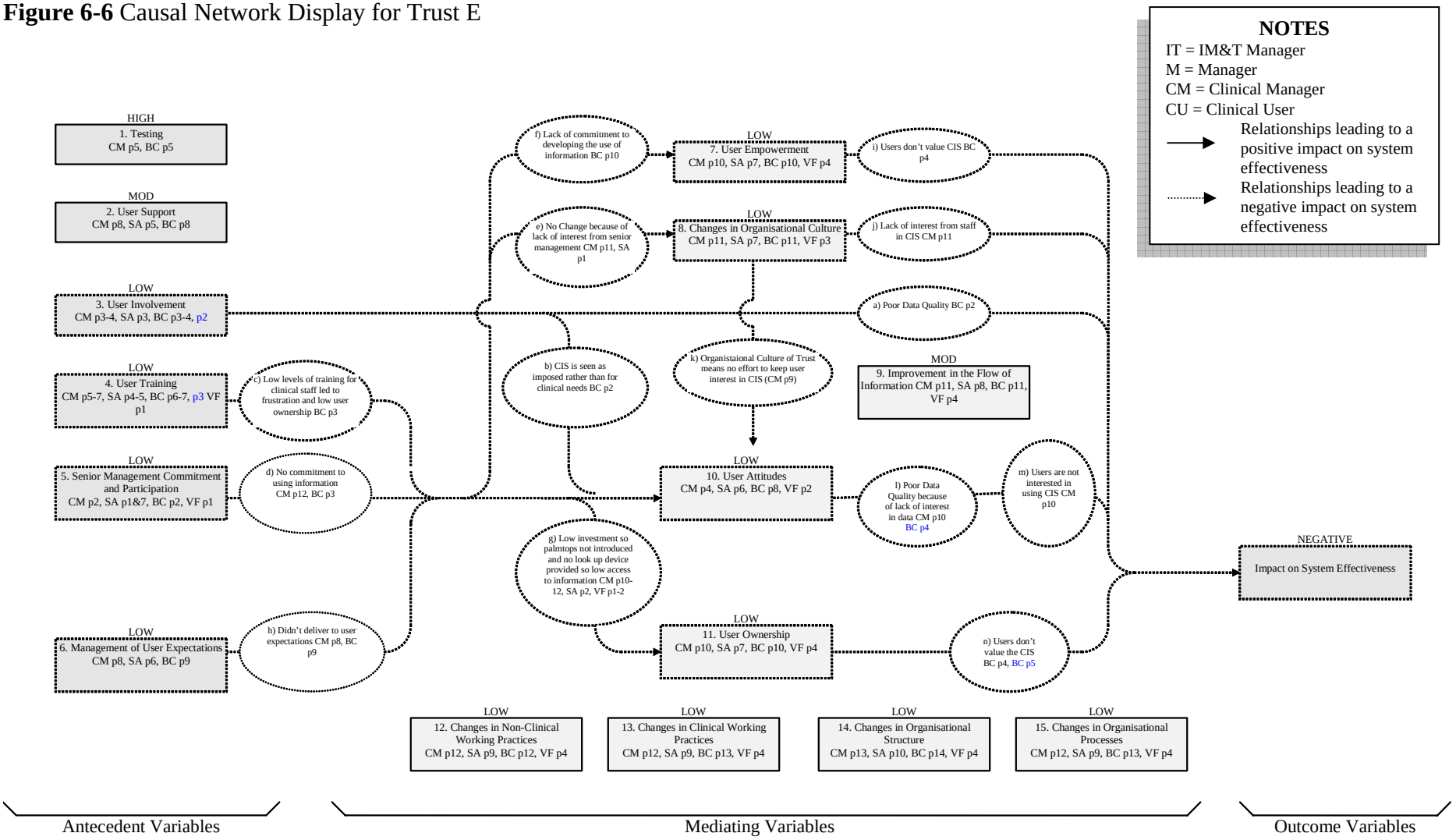
Trust E: The Implications of Adopting Best Practice

It can be seen from Figure 6.6 that the adoption of best practice at Trust E has been poor. There were only two aspects that were thought to have been performed reasonably well, these being the testing of the system (already discussed) and the support that was provided for users.

The **user support** (2) took the form of an IT Help Desk that dealt with enquires from clinical and input staff. The support was not formalised, but staff were encouraged to phone should they have any problems or difficulties with the system. A questionnaire survey was conducted to assess the support and it was reported (IM&T manager, E) that the support had been viewed as a success.

In contrast, the remaining best practice variables were not adopted at Trust E. For example, it was stated that there had been low levels of **user involvement** (3) for the majority of the development, implementation and operation of Comwise. It was noted that some clinicians had been involved in choosing the system during the procurement and that once the system had been delivered clinical staff were involved in developing its coding structure. However, rather than this involvement being viewed as a positive, it was thought by one informant that clinicians had little interest in being involved in developing the system. She stated:

Figure 6-6 Causal Network Display for Trust E



> *'Just involving them in coding and things like that is just another chore as far as they are concerned.' (manager, E).*

Similarly, it was noted by another informant that the style of involvement changed during the project to a more imposed approach rather than being sensitive to clinicians' views. She stated:

> *'Apart from the early days when the professional Heads of Services were involved, when the "Shall we do this? Shall we do that?" sort of questions were asked, its been very much, "This is what we are going to do", rather than, "Well, what do you think?"' (clinical manager, E).*

It was thought that low user involvement had two negative effects for the project as a whole. Firstly, not involving users was thought to be directly impacting on the effectiveness of the system through poor data quality (a). It was suggested (clinical manager, E) that as the clinicians are not involved and do not feel that the data they are entering has any value or relevance to them, then they are unlikely to put great efforts into ensuring the data was accurate. Secondly, it was thought that low user involvement had resulted in negative user attitudes (10) towards the system. A manager stated that had the clinicians been more involved in developing the system then they would have had greater interest in using the information. This lack of involvement resulted in the staff perceiving the CIS to be imposed (b), rather than developed for their clinical needs.

Training (4) was provided at Trust E for both the clinical and input staff with mixed success. A similar approach was taken for both groups, the staff being trained by locality over a period of 2-3 days allowing staff to drop in when they had time. The training for the input staff was quite intensive and was considered important because of the need for these staff to be able to accurately enter data onto the system. In contrast, the training provided for clinical staff was less intensive and concentrated on how to complete the paperwork: *'We had a series of lectures telling us the things we needed to know about the new forms'* (clinical user, E). A clinical manager was critical of the training for clinicians indicating that it had not sold the system's

potential to staff or trained them in how to access the data that was on the system. She also indicated that this failing in the training had inhibited the development of user ownership stating:

> *'I don't think the training was good for the clinicians. I think there was a frustration from clinicians because they haven't been involved, they haven't been trained to access the information and they don't want to spend time away from their patients doing boring paperwork exercises. I think the training was very good for the input staff but it was lacking for the clinicians and I don't think they feel they own the system as a result of that' (clinical manager, E).*

The responses from informants suggest that the training was sufficient in order to allow the system to be rolled out and function but did not seek to provide staff with any knowledge to develop their own use of the system. Consequently, although training was provided to staff, informants believe that it should have been more comprehensive in the use of the CIS. The fact that no effort was made to address these issues has resulted in frustration from clinical staff and low user ownership, both of which are thought to have a negative impact on system effectiveness.

It was agreed by informants that there had been low **senior management commitment and participation** (5) for the majority of the CIS project. Senior managers were thought to have little interest in the information on the system apart from the basic information that was needed to satisfy contracting requirements. For example, informants made the following comments:

> *'I would say there was some initial excitement from senior managers over clinical issues, but it went very quiet as the implementation went on. It is now spasmodic, I don't think there is any day-to-day interest at the moment' (IM&T manager, E).*

> *'The Clinical Director of Nursing Services, I think he feels that it is too time consuming as far as taking up staff's clinical time, so he hasn't really been very supportive. He feels that it is a nuisance really. He is not interested at all in the*

system' (manager, E).

'There was no commitment from the senior management team beyond the pure contract information stuff. There was no sense of leadership if you like, or support' (clinical manager, E).

The informants identified four areas where low senior management commitment had a negative impact on the organisation. The first of these areas were user attitudes. It was stated by informants that there had been a complete lack of commitment to using information from the CIS in any way other than for contracting purposes (d). No effort or support had been given to developing the system for clinical needs. An informant stated that:

'The clinical information side has really suffered from a lack of senior management support. There was a fairly positive response from the Finance side, simply because they needed the system to fuel their invoices, but there has never been any sense that we can use the CIS as tool to inform clinical practice or provide a research basis for what is going on throughout the Trust. That side of things has been very negative for users' (clinical manager, E).

It is considered by informants that the lack of interest from senior management has created negative attitudes towards the system from users because they have no direct benefit from entering the data. Staff therefore feel resentful towards the CIS and the paperwork that is associated with it, seeing it as an intrusion in their delivery of patient care.

It was also suggested by informants that the lack of interest from senior management had also inhibited the development of user empowerment. The reason that was offered for this lack of empowerment was the same that was causing negative user attitudes. There was no support from senior managers to encourage empowerment and this was manifested in little investment in the system to allow clinical staff access to information on Comwise. Consequently, staff had no provision of useful, relevant information with which they could review and change their working practices.

The third negative result of low senior management commitment was a minimal change in organisational culture (8). It was stated by the IM&T manager that it would be desirable to develop an information culture within the Trust but that so long as the current senior management structure was in place there would be no change in culture (e). This view was supported by a manager who stated:

> *'Until you change the personality at the top you won't change the culture.' (manager, E).*

It was thought by both informants that the lack of an information culture had meant that staff were not interested in the information from the CIS and this was further compounded by the lack of interest from senior managers*: 'If senior management aren't interested, why should the staff be?'* (IM&T manager, E).

Finally, it was also stated by informants that low senior management commitment had resulted in low user ownership (11). It was indicated by several informants that the general lack of investment in the system had meant there were very few lookup devices in the Trust. Consequently, clinical staff had no access to information that they could use in their daily work (g). This low return of information was thought to be inhibiting user ownership because once they completed and sent off their forms, the data effectively disappeared into a 'black hole'. One clinical user indicated that they had a greater sense of ownership of the data when they were using an old fashioned ledger to record patient care because they could delve back into it should they need to find past details of a patient's care. It was stated that there might be a greater sense of ownership should palmtop computers be made available to clinical staff in the Trust but that this sort of investment was unlikely. Therefore, it was thought that there would be low levels of user ownership for the foreseeable future.

It was also reported that there had been low **management of user expectations** (6) at Trust E. A manager (E) thought that efforts had been made to raise user expectations prior to the implementation of Comwise commenting,

> *'I think so, yes, they tried to. They kept saying, you'll be able to get this, that*

and the other.'

However, she went on to say that these expectations were never met,

'It just didn't materialise and people lost interest.'

The IM&T manager and clinical manager also supported these comments and indicated that not realising the proposed benefits for users had been very negative and resulted in poor user attitudes towards the CIS. It was considered that not managing user expectations had resulted in a negative impact on the overall system effectiveness through negative user attitudes.

Trust E: Level of Organisational Impact

It can be seen from Figure 6.6 that the development and implementation of a CIS has had practically no organisational impact at Trust E. There have been no changes in **non-clinical working practices** (12) because staff are completing practically the same forms as they used under the old system and a low return of information has inhibited the development of **clinical working practices** (13). There have also been no changes to the **organisational structure** of the Trust (14) and little change had occurred or was expected to occur, in the Trust's **organisational processes** (15).

Similarly, informants reported that there had been very little **empowerment** (7) of users as a result of the system and it was stated by the IM&T manager that achieving empowerment had never been an aim of the system. The low return of information was offered as the main reason for the lack of empowerment in Trust E resulting in the clinicians associating little value with the CIS (i) This negative view was thought to be having a detrimental impact on the perceived effectiveness of the system.

It was also indicated that there had been little change in the **organisational culture** (8) of the Trust since the implementation of Comwise. It was thought that the lack of support and interest from senior managers, coupled with an overemphasis on speedy implementation rather than attempting to change user attitudes (k) had stifled the development of an information culture within the Trust. An informant stated:

> *'It comes back to the culture of the organisation. During the implementation from FIP to Comwise we had our heads completely down on getting the next group on and getting the next group trained. By the end of that we then realised that the first group that had been put on had lost interest.' (IM&T manager, E).*

It is suggested that the culture of the organisation meant that the priority for the IT Department was to implement the CIS quickly so data could be provided for contracting. There was little attempt to inspire or interest staff in the use of information. This cultural attitude was manifested in the training that was provided to support the implementation of Comwise because it concentrated purely on the mechanics of recording the data rather than attempting to encourage staff to use the information (j). Consequently, staff soon lost interest in the system once they had undergone their initial training. Data recording became an unnecessary chore for the clinicians because of a lack of benefit and resulting in negative user attitudes (10). It was considered by informants that the low change in organisational culture and lack of interest from staff in the system had a negative impact on the system effectiveness.

The only organisational change that was noted by informants resulting from the CIS was a moderate positive change in the **flow of information** (9). It was stated that there had been a considerable increase in the amount of information the Trust was able to provide about its services to both purchasers and GPs. It was also thought by the IM&T manager that more detailed information could be provided compared to what was available using the old system, however, doubts remained over the accuracy of this information. In contrast, both the clinical manager and clinical user thought that there had been no improvement in the flow of information at a clinical level and no informants indicated that the changes in the flow of information had influenced the overall perceived effectiveness of the CIS.

Trust E: User attitudes and User Ownership

All the informants agreed that there were **negative user attitudes** (10) towards the CIS at Trust E. The IM&T manager did state that the IT Department had attempted to develop more positive attitudes in the early stages of implementation, through various meetings with staff groups to develop the coding structure, but concluded that these

attempts had been unsuccessful. The remainder of the informants took the view that collecting information for the CIS was a 'necessary evil' that demoralised staff because they received no benefit for the effort that they put in. Consequently, it was thought that negative user attitudes had created problems with the data quality because staff were not inclined to put any effort in ensuring that the data are recorded accurately (l). It was also argued that because of the lack of benefit for clinicians there was little interest from the staff in the system or using information that was available from the system (m). Both these effects of negative user attitudes were thought to be having a direct cause of the low level of perceived system effectiveness associated with the CIS.

The informants were also united in their view that there had been **low user ownership** (11) at Trust E. It was stated that there had been no effort made to develop user ownership (clinical manager, E) because of a lack of commitment to using information from senior management. As was the case with user attitudes, informants commented that they thought the users regarded the completion of the paperwork to support the system 'as part of the daily grind' without reward. Consequently, the users placed little value on the system (n) or the information it contained, compounding the problem of poor data quality and adding to the negative impact on the overall perceived system effectiveness.

Trust E: Measure of System Effectiveness

The results from the performance questionnaire indicate that the CIS is generally performing badly. The informants are broadly consistent in their views and the only area that was identified as being successful was the technical functionality of the system. There were low scores concerning the quality of the reports from the system reflecting informants' concerns about data quality and all informants thought that both managers and users had made little use of the CIS for their work activities.

Some informants were slightly more positive when they answered questions about management information needs indicating that they thought management needs were satisfied by the CIS and that management did not actively dislike the system. However, these results were in contrast to user requirements as all informants clearly

thought that user needs had been met very poorly and that the users disliked the system.

The results also indicated that the majority of informants were undecided whether the implementation of the system had resulted in any improvements in the performance or functional output of the Trust. The IM&T manager thought that the CIS had little effect in these areas suggesting that the CIS had only achieved the very limited objectives set for it. Consequently, it is not surprising that the poor levels of effectiveness achieved by the CIS at Trust E are reflected in the overall performance score of 2.4.

6.6 SUMMARY

The within case analysis and results have confirmed that the Trusts chosen for further in depth study have provided a range of experiences in terms of their community information systems and associated levels of perceived effectiveness. Each of the five previous sections have provided a solid foundation and understanding from which it is possible to derive a detailed cross case analysis. However, before the cross case analysis and results are reported, a brief summary of the key features of each Trust is provided below.

Trusts A and E have had the Comwise CIS for the longest period of time, the roll out of both systems starting in 1995. Trusts B and D upgraded their CIS to the Comwise module in 1997 and 1996 respectively, however, both Trusts introduced palmtop computers in 1993 while still using the old Comway 2000 package. Trust C was the latest of the Trusts to get Comwise (1997) and is the only one that had not completed the roll out of the system at the time of the interviews.

In addition, all the Trusts apart from Trust E, use palmtop computers to support their CIS with the onus on clinical staff to enter their own data. Consequently, Trust E was the only Trust still using a paper based approach for recording clinical care data that were entered by clerical input staff. Trusts A and C have adopted a care package and care objective approach to the delivery of care by clinicians, an approach that is in line with the natural configuration of the Comwise system as well as NHS

recommendations. The other Trusts had not decided to adopt this new style of working at the time of the interviews.

Table 6.4 shows the range of average success scores calculated for each informant and the overall success scores calculated for each Trust. It can be seen from Table 6.1 that informants in Trusts A, C and E are fairly consistent in their views. However, the average scores for Trusts B and D reflect the more varied perceptions of informants at these Trusts. Scores range from 4.2 down to 1.3 in Trust B and from 4.1 to 2.7 in Trust D suggesting that there is a considerable difference between different informants' experiences of the CIS at these Trusts. Analysis of the data collected at the different Trusts, reported in detail in the earlier sections, suggested that overall Trust B should be viewed as more successful than the overall success score suggests and Trust D should be viewed as less successful.

Table 6:4 Average and Overall Success Scores

Informant	Trust A	Trust B	Trust C	Trust D	Trust E
IM&T Manager	X (4.1)	X (4.2)	X (2.9)	X (2.7)	X (2.3)
Support Manager (IT)				X (2.8)	
Manager		X (3.0)	X (2.7)	X (3.4)	X (2.2)
Senior Clinical Manager			X (3.3)		
Clinical Manager		X (1.3)	X (3.2)		X (2.3)
Clinical User	X (3.9)	X (2.0)	X (3.8)	X (4.1)	X (2.6)
Highest Average Score	4.1	4.2	3.8	4.1	2.2
Lowest Average Score	3.9	1.3	2.7	2.6	2.6
Overall Success Score	4.0	2.6	3.2	3.4	2.4

Note: Average success scores for each informant are presented in brackets

Through the process of analysing the interview transcripts for each respondent, one new best practice variable was identified, a well balanced project team. It was identified by informants in Trusts A, B and C that having a well balanced project team was particularly important in ensuring that a CIS is successfully implemented. In each case this view had resulted in staff with a clinical background being closely involved with the CIS project. In contrast, this variable was not identified or manifested in either Trust D or E.

Trust A has been very successful in adopting best practice with high levels of each variable identified by informants. It was also identified that the CIS had a large impact on the organisation and that this impact had a positive influence on the overall effectiveness of the CIS. Furthermore, positive user attitudes and high levels of user ownership were reported that were also considered to be contributing to the effectiveness of the CIS. These positive comments and observations were strongly supported by the responses to the performance questionnaire that provided Trust A with an overall success score of 4, indicating that the informants thought their CIS was a success.

Trust B adopted moderate levels of best practice but noticeably had low user involvement and poor management of user expectations. Similarly, the organisational impact that was engendered by the development and implementation of the CIS was also mixed. Informants differed in their views concerning a positive or negative change in organisational culture and indicated that some additional areas had experienced organisational change, such as non-clinical working practices and the flow of information. However, similar changes were not evident in areas such as clinical working practices or empowerment. This mixed view was also in evidence concerning user attitudes and user ownership with positive and negative aspects of both variables being recorded in different areas of the Trust. These differing views were reflected in informants' responses to the performance questionnaire, although the overall success score for Trust B was 2.6.

Trust C has been very successful in adopting best practice with high levels of all variables identified by informants. In contrast, informants identified mixed levels of organisational impact. In some respects high levels of organisational impact were reported such as, changes in organisational culture and changes in the flow of information. In other respects only moderate or low impacts were reported in areas such as, clinical working practices or user empowerment. Similarly, although positive user attitudes were noted as occurring at Trust C, only moderate levels of user ownership were identified. However, it should be noted that Trust C had only partially implemented their CIS at the time of the interviews so it could be expected that Trust C would have had experienced a smaller organisational impact than the

other Trusts. Informants' responses to the performance questionnaire gave the CIS an overall score of 3.2.

Trust D had mixed levels of adoption in terms of best practice. Most significant was the low level of senior management commitment and participation provided for the CIS project and the problems that resulted. Furthermore, informants reported that there had been low levels of user involvement and poor management of user expectations. It was indicated that there had been minimal organisational impact resulting from the CIS with the only noticeable improvement being in the flow of information. There were mixed views expressed about the occurrence of positive user attitudes but the perception of the majority of informants was that user attitudes were negative towards the CIS. Similarly, it was noted by several informants that user ownership was not occurring at Trust D. These differing views were reflected in informants' responses to the performance questionnaire, although the overall success score for Trust D was 3.4.

Finally, informants at **Trust E** reported generally low levels of best practice being adopted. The only variables that were addressed adequately were thought to be user support and testing of the system. Minimal organisational impact was identified by informants with the only positive impact being a moderate improvement in the flow of information. It was stated by all informants that user attitudes were negative towards the CIS and that there was no evidence of user ownership at the Trust. These negative views are supported by the responses to the performance questionnaire that provided an overall score of only 2.4. This result indicates that although the CIS is not considered a failure at Trust E, its performance is particularly poor.

The next chapter presents the results of the cross case analysis that compares and contrasts the case studies to develop a series of explanations for their differing experiences and levels of performance. In addition, summary tables showing the adoption of the best practice, areas of organisational impact and the occurrence of positive user attitudes and user ownership across all the Trusts are provided.

Chapter 7: Cross Case Analysis of Case Studies

7.1 INTRODUCTION

Following the detail provided by the within case analysis in chapter six, this chapter takes a more explanatory approach, studying the similarities and differences in the relationships between the key variables across the five Trusts. As indicated in chapter three, this approach provides a basis from which to draw interpretations and increases the likelihood of drawing conclusions that are generalisable to Trusts outside those studied.

The chapter begins with a summary of the methodology adopted for the cross case analysis. Following this description the results from the analysis are presented in four main sections with each section being directly related to one of the overall research objectives of this study. The first section studies the relationship between the adoption of key best practice variables and system effectiveness. The second section addresses the relationships between key organisational impact variables and system effectiveness. The third section studies how the organisational impact resulting from the implementation and operation of a CIS can be managed and identifies some of the key treatment approaches adopted to ensure a positive organisational impact. The fourth section studies the relationships between user ownership and user attitudes and success and addresses the role of best practice variables as treatment approaches for both ownership and attitudes. Finally, the chapter concludes with a discussion of the

research results, drawing together the key elements and providing a series of interpretations and explanations.

7.2 METHODOLOGY FOR CROSS CASE ANALYSIS

The within case displays, discussed in chapter six, provided a sound basis from which to develop the cross case analysis having already documented the detail of each Trust. There are three possible strategies to consider when preparing to conduct cross case analysis: case-orientated strategies; variable orientated strategies; and mixed strategies. Each strategy is briefly reviewed below.

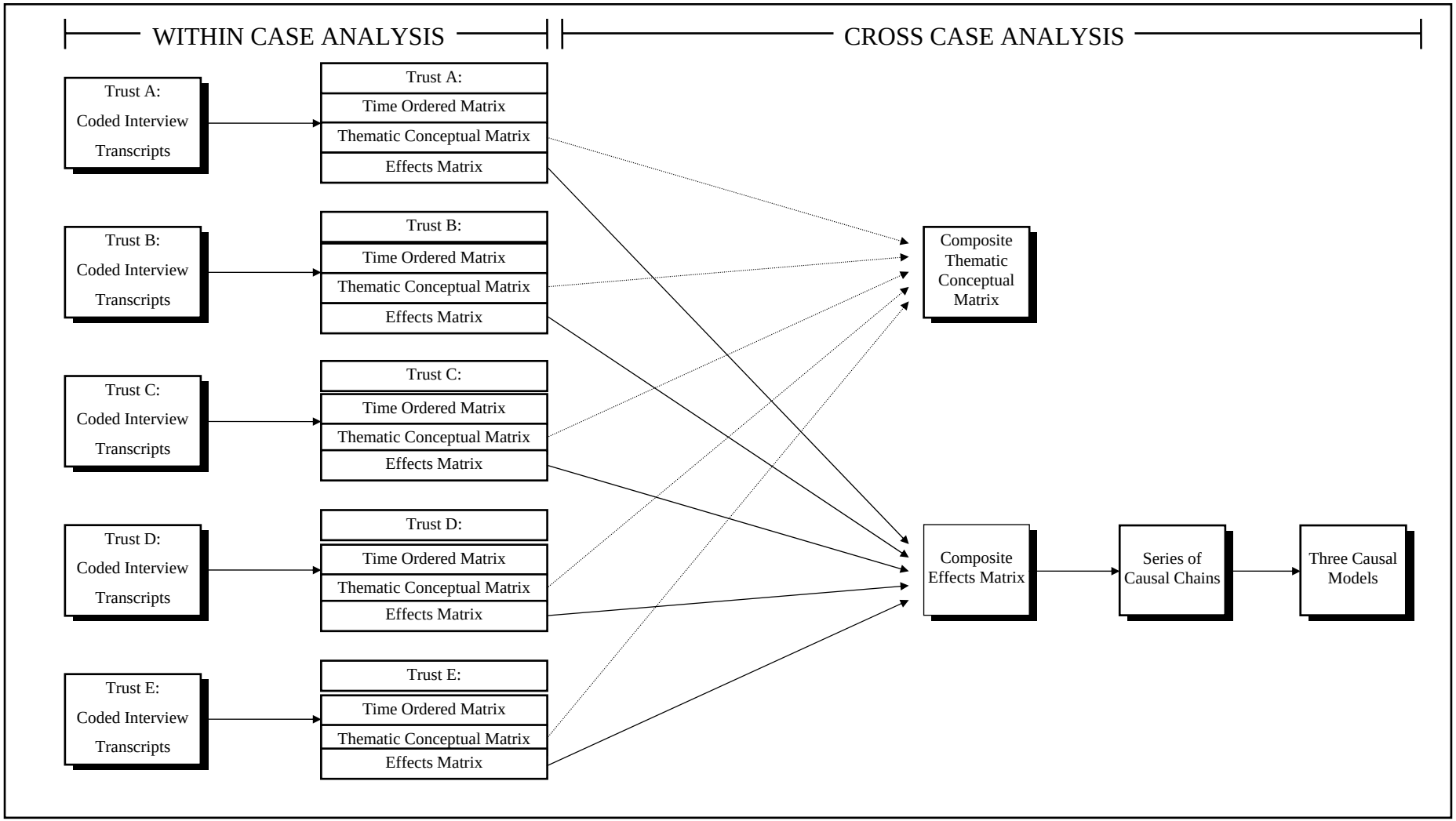
1. Case-orientated strategies concentrate on individual cases and search for patterns, associations, causes and effects within the case and then look to other comparative cases for generalisibility (Ragin, 1987).

2. A variable-orientated strategy is more conceptual in nature and focuses more on the role of key variables driven by theory. A larger number of cases are usually involved and the researcher is looking for broad patterns across cases paying less attention to case-to-case comparisons (Runkel, 1990).

3. The third approach combines the two previous approaches and concentrates on a standard set of variables to analyse each case in depth (Miles and Huberman, 1994).

For the current analysis the third, mixed approach was chosen because of the need to derive generalisations by studying a series of key variables included in best practice, organisational impact, user ownership and user attitudes across cases, while still retaining some understanding of case dynamics. The cross-case analysis took the form

Figure 7-1 Within Case and Cross Case Analysis of Results

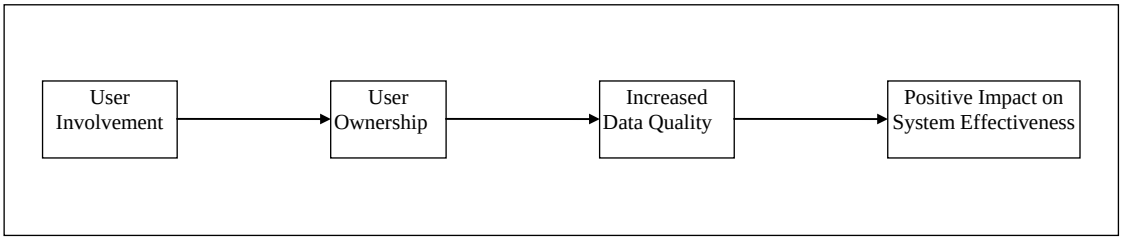


of a composite thematic conceptual matrix (Miles and Huberman, 1994: p131) and three cross case causal models (Miles and Huberman, 1994: p222). The composite thematic conceptual matrix combined the five conceptually ordered displays developed for each Trust (discussed in chapter six) and allowed the researcher to study the similarities and differences between the facilitators and inhibitors for each variable across all five Trusts.

A causal model is a network of variables with causal connections among them, drawn from multiple-case analyses. Although empirically grounded, it is essentially a higher order effort to derive a set of propositions about the complete network of variables and interrelationships. The three causal models were developed by combining the five effects matrices for each Trust into a single, case-ordered effects matrix to show an overall view of the outcomes of the variables concerned. A case-ordered effects matrix sorts the cases by degrees of the major cause being studied and shows the diverse effects for each case (Miles and Huberman, 1994: p209).

From the single, case-ordered effects matrix a series of linear causal chains were developed. Miles and Huberman (1994) suggest that at the start of causal modelling it helps to make simplifying assumptions about what leads to what, placing causes and effects in a linear chain. Causal chains are useful because they require little elaboration or textual explanation. They provide a simple interpretation that can be elaborated and linked with other chains to form causal models. An example of a causal chain is provided below.

Figure 7-2 Causal Chain: Illustration



Consequently, causal chains were used to display the linkages between variables more clearly, before they were synthesised into three overall causal models. The methodological processes adopted for the cross-case analysis are shown in Figure 7.1.

The results from these cross case displays are presented in the following four sections.

7.3 RESEARCH RESULTS

The research results are divided into four main sections, each reflecting an overall research objective of the study. In a similar approach to that taken in chapters four and six the research findings are reported in this chapter by presenting evidence in the form of specific examples and comments gathered through the interview process.

7.3.1 The Relationship Between Best Practice and System Effectiveness

During the interviews the best practice variables and their relationship with CIS effectiveness were discussed. The importance of these best practice variables to information system success has already been established in the literature, (see chapter two) and the responses from informants strongly supported the existing research. However, the actual occurrence of these best practice variables did vary between the different Trusts as shown in Table 7.1. This table indicates that informants in Trust A perceived that their Trust had been very successful in the adoption of best practice. By contrast, the findings for Trust E indicate that they were the least successful in the adoption of best practice. The remaining three Trusts were generally better than Trust E but behind Trust A, either in the adoption of best practice or in terms of the perceived effectiveness of their systems. These results suggest that those Trusts that adopt high levels of all the best practice variables are more likely to achieve higher levels of perceived effectiveness associated with their CIS. More specifically, several direct relationships were identified by respondents as being important to the level of perceived success associated with their Trusts CIS. The best practice variables concerned were senior management commitment and participation, user involvement and user training. Each of these relationships is reviewed below[15].

Senior Management Commitment and Participation

Informants in three Trusts (A, B & C) identified that having high levels of senior management commitment and participation directly contributed to the perceived

[15]The other best practice variables (systems testing, user support, well balanced project team and management of user expectations) were not included in this section because informants did not identify

effectiveness of the CIS. The main form of this commitment was either through the

Table 7:1 Level of Adoption of Different Best Practice Variables at Each Trust

Best Practice Variable	Trust A	Trust B	Trust C	Trust D	Trust E
Senior Management Commitment and Participation	+	+	+	-	-
Well Balanced Project Team	+	+	+		
User Involvement	+	-	+	-	-
Management of User Expectations	+	-	+	-	-
User Training	+	+	+	+	-
User Support	+	+	+	+	≈
System Testing	+	+	+	+	+
Perceived Success	4.0	2.6*	3.2	3.4*	2.4

Note: + denotes high occurrence of variable, - denotes low occurrence of variable, ≈ denotes moderate occurrence of variable. The overall measure of success is based on a 5 point Likert scale ranging from 1, CIS is very unsuccessful to 5, CIS is very successful.

provision of resources (A, B & C), the appointment of a systems champion (A & B) or providing strong driving support for the project (C) and good project management (C). The relationship was also identified by informants in Trust D, however, in this case they indicated that low levels of senior management commitment and participation had resulted in a direct negative impact on the success of the CIS project. The IM&T manager (D) stated that the project had generally been given a very low priority within the Trust, manifested most recently with a strong reluctance

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a direct relationship between these variables and success.

* The apparent anomaly of Trust B, that shows a high adoption of best practice but a low success score and Trust D that shows low adoption of best practice and a high success score, can be explained because of the mixed perceptions recorded from informants towards the CIS in these Trusts. It is suggested that, based on the within case analysis, Trust B should be viewed as more successful than the overall score suggests and that Trust D should be viewed as less successful. A further discussion of this point is provided in the summary (section 6.6) of chapter six.

to upgrade the system to make it Year 2000 compliant and an overall lack of financial support resulting in much of the hardware, such as the palmtop computers, being in a poor state of repair.

User Involvement

The advantages of having user involvement were identified by informants in Trust C as having a direct impact on the success of a CIS project. The IM&T manager (C) stated that having user involvement was especially important when *'dealing with a group of staff who largely have little or no IT expertise'* and that the involvement had *'allayed the fears of staff.'* It was also noted by a manager in Trust C that user involvement had been crucial in ensuring that the system was in line with user work requirements and in avoiding user resistance stating that:

> *'I don't think we could have done it without them. I think the system would be in a mess if we hadn't asked local people about their work situation and what would work for them. We would probably have had a riot along the way as well' (manager, C).*

A similar relationship was identified in Trust B where an informant noted that the lack of user involvement had resulted in a poor understanding of user needs by the project team stating:

> *'It's inevitable that if somebody is setting up a system for you and you are not involved, then they won't understand how your service works and it's going to be difficult to set the system up correctly if they don't know what you do' (clinical user, B).*

An informant in Trust E also indicated that the lack of user involvement at their Trust had contributed to the low level of effectiveness associated with their CIS with doubts over the accuracy of the data being entered. In response to a question about the effects of having low user involvement the informant responded:

> *'I wonder how valid some of the data is. If the clinicians don't think it is*

particularly valid to them then they are not going to spend time producing accurate data' (clinical manager, E).

User Training

Finally, it was also noted by an informant that user training was important to system success especially if palmtop computers are to be used by staff, stating:

'If you are doing things on palmtops the training is absolutely crucial. You have got to make sure that everybody knows what they are doing' (IM&T manager, D).

The IM&T manager (D) indicated that because of the organisational structure of community Trusts, with staff working on a decentralised basis and having considerable autonomy in their daily work, user training takes on great importance. Staff would frequently be using their palmtops in a patient's home, in isolation from other colleagues or IT support services and consequently, it is vital that staff are confident in their ability to use the CIS. If the staff are sent out with inadequate training and as a result encounter problems during patient visits then there is likely to be a high level of user resistance to the system. It would be expected that this resistance would, in turn, foster a low level of perceived effectiveness associated with the CIS.

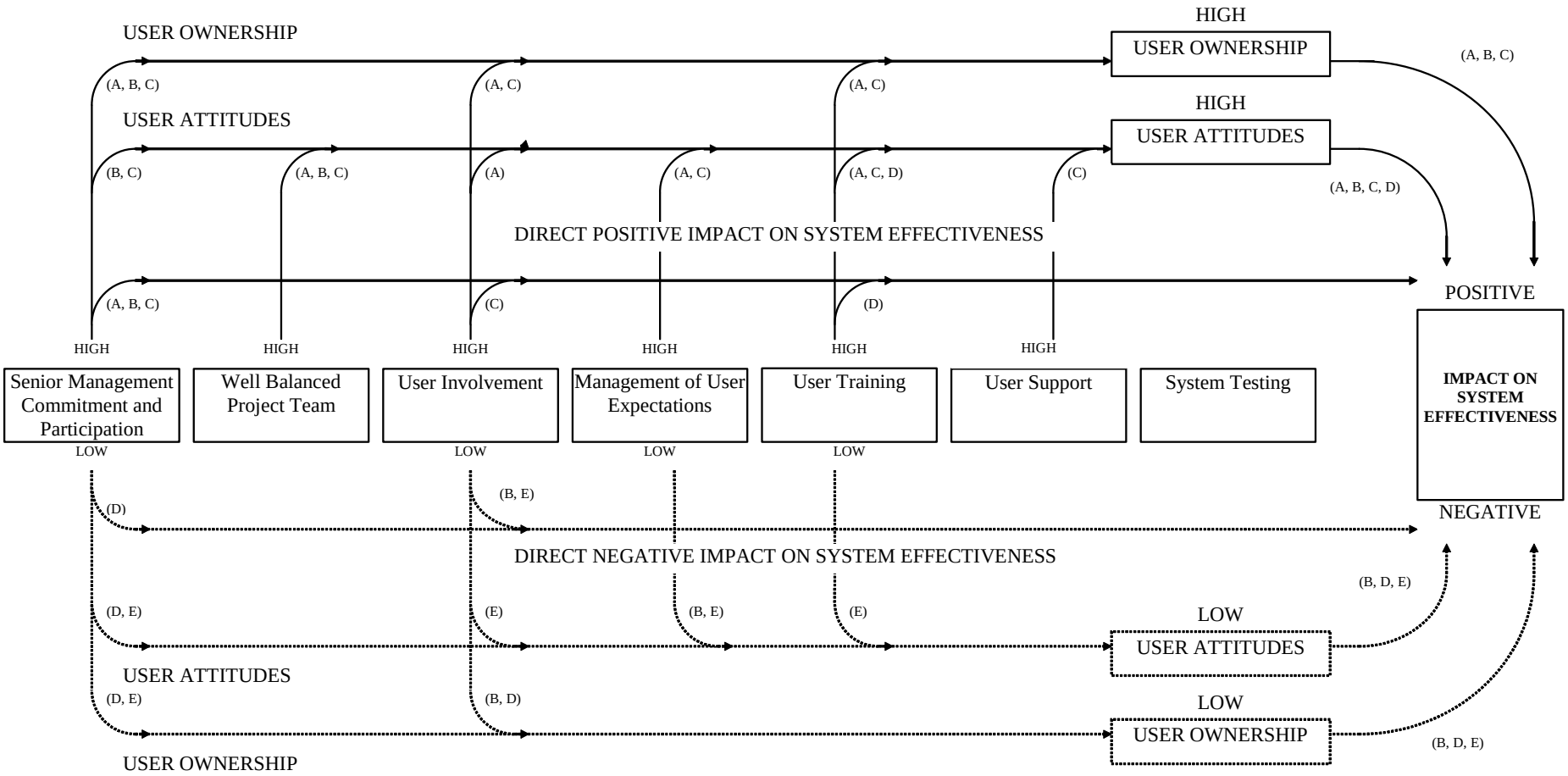
The direct relationships between best practice variables and system effectiveness are presented in Figure 7.3. The following section considers the effect of organisational impact on system effectiveness.

7.3.2 The Role of Organisational Impact in the Successful Adoption of a CIS

During the interviews the role of organisational impact and its relationship with system effectiveness was also discussed. The importance of the organisational impact variables has already been reviewed in chapter two and the responses from informants supported the existing research. However, as in the case of best practice, the level of organisational impact varied between the different Trusts as shown in Table 7.2. The table shows that informants in Trust A perceived there to have been reasonably high

levels of organisational impact resulting from their CIS.

Figure 7-3 Causal Model Showing the Relationships Perceived to Exist Between Best Practice Variables, User Attitudes, User Ownership, and their Perceived Impact on System Effectiveness



Note: Letters in brackets relate to Trusts where informants perceived a causal link to exist

In contrast, informants at Trust E stated that they had experienced almost no organisational impact. The remaining Trusts generally fared better that Trust E but worse than Trust A in either the level of organisational impact or in terms of the effectiveness of their CIS. These results suggest that those Trusts that experience higher levels of organisational impact are more likely to achieve higher levels of perceived system effectiveness associated with their CIS.

Table 7:2 Level of Organisational Impact at Each Trust

Organisational Impact Variable	Trust A	Trust B	Trust C	Trust D	Trust E
User Empowerment	≈	-	≈	-	-
Change in Organisational Culture	+	+	+	-	-
Changes in Flow of Information	+	≈	+	≈	≈
Changes in Non-Clinical working Practices	≈	≈	≈	-	-
Changes in Clinical Working Practices	+	-	≈	-	-
Changes in Organisational Structure	-	-	-	-	-
Changes in Organisational Processes	+	-	-	-	-
Perceived Success	4.0	2.6*	3.2	3.4*	2.4

Note: + denotes high occurrence of variable, - denotes low occurrence of variable, ≈denotes moderate occurrence of variable. The overall measure of success is based on a 5 point Likert scale ranging from 1, CIS is very unsuccessful to 5, CIS is very successful.

More specifically, several direct relationships were identified by informants as being

* The apparent anomaly of Trust B, that shows moderate organisational impact but a low success score and Trust D that shows low organisational impact high success score, can be explained because of the mixed perceptions recorded from informants towards the CIS in these Trusts. It is suggested that, based on the with case analysis, Trust B should be viewed as more successful than the overall score suggests and that Trust D should be viewed as less successful. A further discussion of this point is provided in the summary (section 6.6) of chapter 6.

important to the level of perceived effectiveness associated with their Trusts' CIS. The organisational impact variables concerned were changes in organisational culture, user empowerment, changes in the flow of information and changes in clinical working practices. Each of these relationships is reviewed below.

Changes in Organisational Culture

Informants in two Trusts (A & B) indicated that changes in organisational culture had a direct positive impact on system effectiveness. It was stated that the culture of these Trusts had changed in a number of respects and the IM&T manager in Trust A indicated that these changes had been explicitly planned. She stated that '*Changing the Trust's culture was explicit from the time of doing the first year's pilot and realising that we needed to radically change the way people used information and thought about information'*. This was in contrast to Trust B where the IM&T manager indicated that changes in culture had not been explicitly planned and that *'it was just something the Head of Information had in mind that they were going to do'*.

The main type of cultural change identified at Trust A was the emergence of an information culture (Davenport, 1994). Informants thought that staff throughout the Trust were now looking for opportunities to use the information on the CIS, whereas previously there had been little interest from staff. For example a clinical user, when asked whether they thought there had been a change in the organisational culture of the Trust, replied:

> *'Oh enormously! Enormously!*
> ***So there's been a big change in the way staff think about information?***
> *Yes, people's thinking is essentially different. I think managers have started using information to manage their service, not just to show that they are meeting the contracts, so yes, it has gradually developed and grown. The more information you get out, the more questions you ask' (clinical user, A).*

Similarly, informants in Trust B stated that their organisational culture was now far more information focused for both managers and clinical staff. For example, the IM&T manager thought that this information culture had been manifested by clinical

staff having a greater awareness of how they were organising their daily work. She stated that:

> *'I think it has made them [clinical users] more aware of the jobs they are doing on a job to job basis and the fact that when they are not actually seeing a patient they are aware of what they are doing' (IM&T manager, B).*

The IM&T manager believed that by providing clinical staff with more information about their daily work activities, an information culture was developing that, in turn, was facilitating direct benefits to the Trust through increased efficiency. Further benefits that were identified in these Trusts were, users valuing the CIS because it supports action research projects that can improve care delivery (A); and a greater interest from managers that are exploring what can achieved through using information (B).

However, an informant at Trust B also indicated that additional changes in organisational culture had occurred that were considered to be having a negative impact on the perceived effectiveness of the system. A clinical manager thought that the introduction of the CIS had facilitated the development of a 'blame' culture at the Trust, with the staff fearing that the system would highlight any mistakes that they made, leading to reprimands or even disciplinary action. She stated that,

> *'I think they [clinicians] regard it [CIS] as 'Big Brother' and as a policing tool' (clinical manager, B).*

The clinical manager thought that negative culture was having a detrimental effect on the CIS project, the clinicians disliking the system and not associating any value with it.

A further negative relationship regarding organisational culture was identified at Trust E. Here, an informant suggested that little change in organisational culture had resulted in a negative impact on the system's overall effectiveness. The IM&T manager (E) indicated that there was a lack of interest in the CIS from clinicians

because no efforts had been made by senior management to develop a culture of using information. The lack of an information culture exhibited by senior managers was thought to be having a negative impact on users' motivation and interest in using the system. The IM&T manager (E) commented:

> *'If senior management aren't interested in the information, why should the staff be?'.*

These results suggest that those Trusts whose CIS has engendered significant changes in organisational culture are more likely to have successful systems than Trusts that experience little change. However, the experience of Trust B emphasises the importance of effectively managing a change in organisational culture to ensure a positive impact on the overall perceived effectiveness of the CIS. These management practices are discussed in section 7.3.3.

Changes in User Empowerment

Informants in Trusts A and C identified a direct positive relationship between user empowerment and system effectiveness. In both these Trusts, it was stated that user empowerment had been planned as a specific objective for the system and that moderate levels of user empowerment had been achieved.

In Trust A user empowerment was manifested during the implementation through allowing the users to choose their method of data entry. Once the system was fully implemented users perceived that they were more empowered to use the information from the CIS to make changes in existing practices. For example, a clinical user in Trust A stated that:

> *'I think we are more empowered and I sense the fact that we are moving towards the decentralised pulling off of reports, means that we will continue to be empowered to use the information in the future as well'.*

Similarly, the IM&T manager in Trust C felt that the users had been empowered because the CIS gave them *'immediate access to patient based information'*. As a

result of this increased empowerment, users were demanding specific reports to look at managing their workloads more effectively. For example, a clinical manager (C) stated:

> *'The team leaders particularly, I think have felt empowered to actually say "I want a report on 'x'". They actually want to look at caseload management and different issues. I think a lot more people are becoming aware of how powerful information can be, comparing caseloads and things'.*

It was stated by informants that increased user empowerment had provided several direct benefits through improving clinical working practices and the delivery of patient care. Users are now in a stronger position to make pro-active changes in their clinical working practices and respond more quickly to changing patient needs, that in turn raises staff interest in using information. Informants made the following comments:

> *'Having greater empowerment has impacted on our clinical working practices, people are sort of, more hands on in changing or refining their working practices.*
> ***Thereby improving the delivery of patient care?***
> *Yes' (clinical user, A),*

> *'Achieving user empowerment has demonstrated the value of giving clinicians access to information and by having direct access they can influence patient care better.' (IM&T manager, A),*

> *'I think empowerment has allowed a shift towards informing clinical practice and to actually getting the users involved.' (senior clinical manager, C),*
> *'I think the next step is that they [clinicians] will look at what they do and I think we have started this with the reporting process. I think they will say, look, we've got all this information, we've got all this data about the way we work, we can now start to analyse it to see if there is a more effective way of working' (IM&T manager, C).*

Similar relationships were identified in Trusts B and E where informants noted that a lack of user empowerment had resulted in a low sense of value associated with the CIS stating:

> *'The staff are not driven by the need to record statistics. Their reason for being here is to treat patients and recording information is just something they do as a by product. Having the CIS has made very little difference to them in terms of empowerment or anything else' (manager, B),*

> *'As I've said, it's always been feeding the beast and that has been a real frustration. Basically the clinicians feel, well, what is the point of having the system if we can't get anything back?' (clinical manager, E).*

The results presented above suggest that there is a direct relationship between the level of user empowerment and the resultant level of system effectiveness, with this relationship manifested in four out of the five Trusts. Even where only moderate levels of user empowerment had occurred, these levels were considered sufficient to have significant benefits in terms of both developing clinical working practices and improved delivery of patient care.

Changes in the Flow of Information

Changes in the flow of information were also identified by several informants as contributing directly to the level of perceived system effectiveness associated with the CIS. In almost all of the five Trusts (A, C, D & E) changes in the information flow had been planned and all the Trusts were thought to be experiencing some degree of improvement.

The most significant changes in the flow of information were identified in Trusts A and C. Informants in both Trusts indicated that there had been a positive change in the flow of information and that this improvement had been manifested through a variety of new reports concerning: case loads; the care programmes being used; the average number of interventions in an episode; the average length of episodes; and the outcome of finished episodes. In addition, informants in Trust C commented that the

CIS had facilitated the removal of some paper based routines and there was a general reduction in the manual collection of data. For example, a manager (C) stated,

> *'The Daily Diary Sheets and all that sort of stuff have stopped, or they have virtually all stopped. So that manual method of collecting data has ceased. The CIS has improved the flow and the accuracy of all executive information'.*

The manager considered this change to be sending out a very positive message across the Trust concerning the benefits the system can produce for clinical staff. This positive message was in turn thought to be increasing the systems perceived effectiveness and value.

An additional benefit that was identified by several clinicians was the ability to defend resource requests. Two informants gave specific examples of how the increased flow of information had meant that they had been able to defend their service and justify requests for additional resources with stronger evidence (clinical user, B; clinical user, D). As a result, the clinicians felt that they were now in a more powerful position and that managers had a greater understanding of clinical workloads, with requests for additional support being more favourably received (clinical user, A; senior clinical manager, C). However, it is interesting to note that while there have been changes in the flow of information, these changes have not led to significant changes in the distribution of power among clinical or non-clinical managers in any of the Trusts. No informants reported that their power had been significantly eroded or enhanced since the introduction of the CIS and it would appear that the system has had limited impact in this respect.

The responses from the informants support the assertion that there is a positive relationship between positive changes in the flow of information and the level of perceived success associated with the CIS. However, this result is not particularly surprising as improvements in the flow of information are arguably, the most likely positive impact to occur following the introduction of a CIS. The fact that all the Trusts had experienced some positive change in the flow of information may explain why none of the informants considered their CIS to be a complete failure.

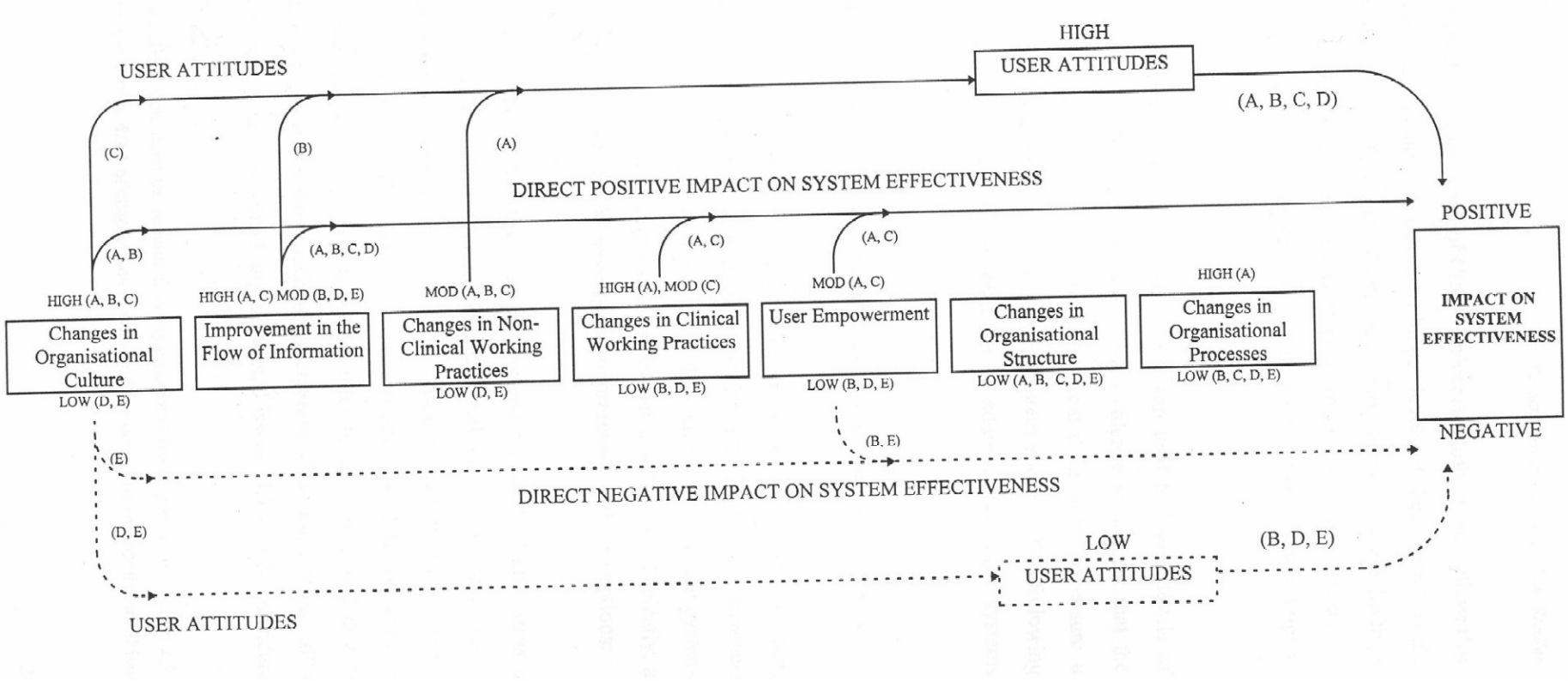
Changes in Clinical Working Practices

Finally, in studying changes in the working practices of clinical users of the CIS it was found that only two Trusts had experienced any significant changes (A & C). Both Trusts had planned to change clinical working practices and informants believed that these changes were starting to occur with staff using information from the CIS to: review their treatment practices against national research results (A); focus more on outcome measures and packages of care (A & C); and generally change the way staff perceive their work (A & C). It was also thought by respondents in both Trusts that clinical working practices were likely to undergo further changes in the future with an *'increasing need for guidelines, performance management and clinical governance'* (IM&T manager, A).

Informants in Trusts A and C considered the major benefit from these changes in working practices to be an improvement in the delivery of patient care. This improvement took two principal forms: either making the service more clinically effective by allowing a more informed allocation of resources; or by using the information to inform clinical practice and support a care package approach. Both these developments are in line with current government policy emphasising a greater need to focus on clinical outcomes rather than purely the delivery of care and to improve clinical effectiveness with greater clinical governance.

This section has presented findings that have identified several organisational impact variables, changes in organisational culture, user empowerment, changes in the flow of information and changes in clinical working practices, that are thought to have a direct relationship with the ultimate level of CIS effectiveness. Informants believe that the relationships move in a positive direction so higher levels of these variables are likely to lead to higher levels of system effectiveness. Consequently, these findings provide evidence to suggest that higher levels of positive organisational impact are likely to engender higher levels of CIS success. A summary of these relationships is provided in Figure 7.4.

Figure 7-4 Causal Model showing the Relationships Perceived to Exist Between Organisational Impact and User Attitude, and their Perceived Impact on System Effectiveness



Note: Letters in brackets relate to Trusts where informants perceived a causal link to exist

If it is accepted that a positive organisational impact can lead to higher levels of system success, then the findings also provide strong evidence to suggest that the organisational impact variables should be explicitly treated in order to ensure a positive organisational impact and in turn, increased system success. The following section investigates how these impact variables can be addressed during a systems development project.

7.3.3 The Treatment of Organisational Issues to Ensure a Positive Organisational Impact

The previous section has suggested that a positive organisational impact resulting from the introduction of a CIS can have a positive impact on the level of effectiveness associated with the system. This finding raises the question, how do systems developers ensure that this positive organisational impact is achieved? Typically, at the outset of a development project CIS developers are presented with two options:

They can take a **pro-active** approach and review and assess the likely areas of organisational impact and then address organisational issues to ensure that a positive organisational impact is achieved. If this option is taken then the potential changes in say, organisational culture or empowerment, need to be assessed, planned and managed by the project team. In order to encourage and develop desirable changes in these variables, such as the creation of an information culture or higher levels of user empowerment, organisational issues[16] have to be considered and effectively managed during the systems development project.

They can take a **reactive** approach and choose not review and manage the organisational impacts resulting from the introduction of a CIS, thereby leaving the nature of the impact to chance. If this option is taken and organisational impacts are not reviewed and assessed, then a development team will not be able to effectively manage organisational issues to ensure that a positive organisational impact occurs. In the case of the examples given, changes in organisational culture and user

[16]For a more detailed discussion about the definition of organisational issues please see section 2.5 of the literature review and section 4.7.1 of chapter four for the working definition of organisational

empowerment will simply be left as areas of uncontrolled organisational impact.

In the light of the previous section's finding, that a positive organisational impact leads to a more effective CIS, it would appear that the first approach should be recommended to CIS developers. The specific treatment approaches available to CIS developers are explored below.

During the interviews informants were asked to identify what they considered to be the main treatment approaches to ensure that the organisational impact resulting from the implementation and use of a CIS had a positive effect on the ultimate success of the system. A range of treatment approaches were identified, however, there was clearly a strong emphasis on the role of best practice variables as the foundations for these methods and this is exhibited in Figure 7.5. For example, high levels of user involvement, senior management commitment and participation and user training were all found to be the basic elements needed to manage organisational issues.

Informants in Trusts A and C stated that encouraging user empowerment had been planned at the outset of the development project. It was stated that in order to develop user empowerment a CIS needed to collect relevant clinical data and clinical staff needed easy and timely access to this data. In both of these Trusts the CIS project team used user involvement to specifically address these issues. Users were able to directly influence and control the priorities set for the system, the composition of the data set and ensure that regular reports were produced that were tailored to the needs of clinical staff. Several informants indicated that these treatment approaches had been effective in developing user empowerment stating:

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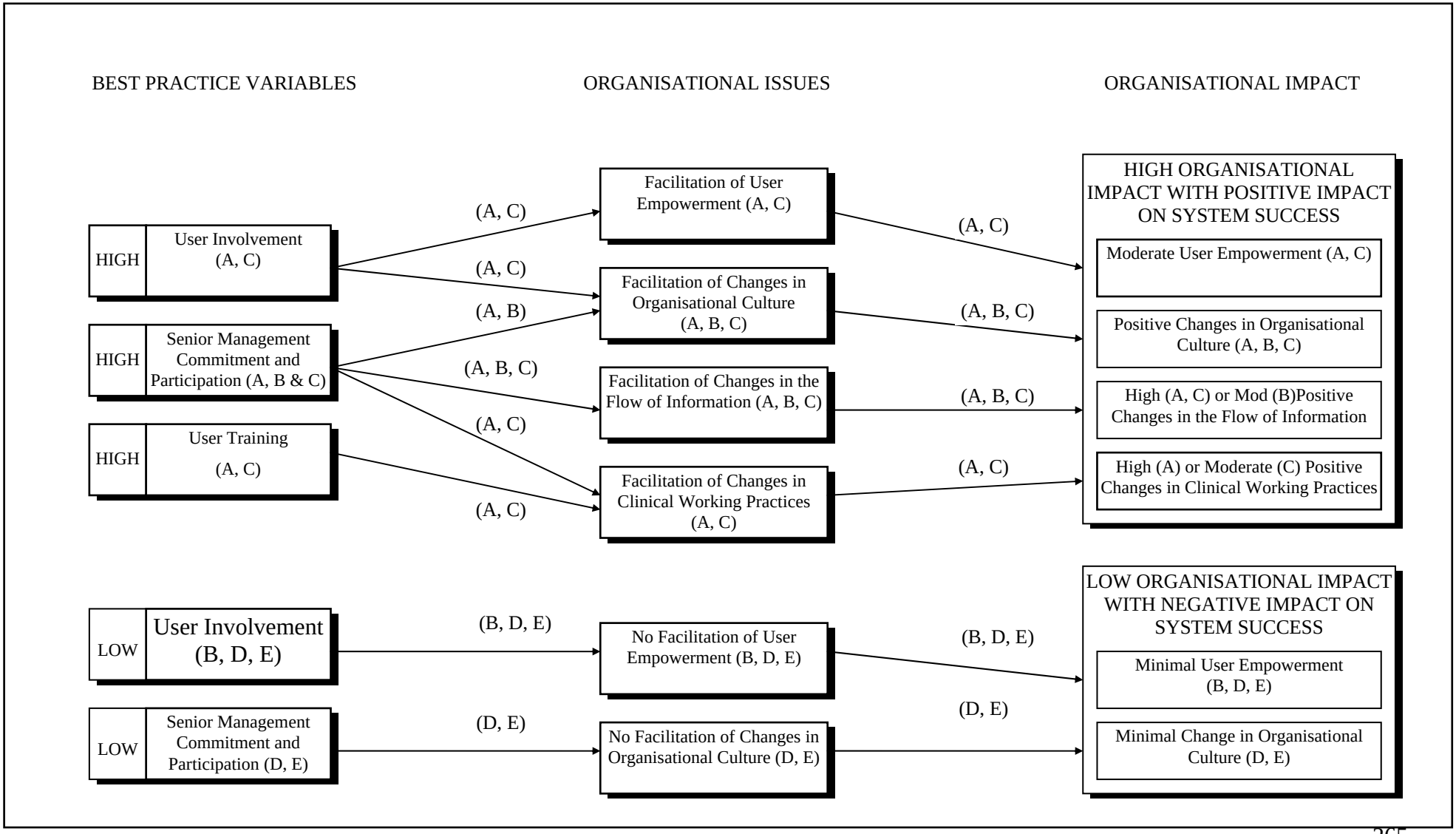
issues used in this study.

Figure 7-5 Causal Model showing the Consideration of Organisational Issues to Ensure a Positive Organisational Impact



'I think user involvement has been important in empowering the users. I think the involvement has driven every development with the CIS. We have decided what is a priority in terms of what data we want on our palmtops and that sort of thing. That shows that the Head of Information and her department are listening to what the clinicians have said.' (clinical user, A)

'We have involved clinical staff to develop routine reports and these reports can be sent out on request.' (IM&T manager, A)

'I think we have shown a commitment to empowering users because of the way in which we have involved them in decisions about how the system is developed. We want the staff to inform the process, generate ideas and determine what information the CIS collects for their benefit as well as ours. I think that is helping encourage user empowerment.' (senior clinical manager, C)

It is interesting to note that at those Trusts where the realisation of user empowerment had not been considered (B, D & E) then minimal levels of empowerment had occurred. It was reported that these minimal changes in user empowerment were causing the system to be perceived negatively by staff and thereby having a negative impact on system effectiveness. For example, informants in Trust B stated that the lack of user involvement had meant that the CIS was not recording data that were relevant to clinicians' daily practices, rarely produced a clinically useful report and was generally viewed as not providing any information for front line clinicians. Informants made the following comments:

'As I said, if a system is set up for you and you are not involved then whoever is creating the system won't understand how your service works. How can we be empowered if the data the CIS is collecting isn't relevant to what we do?' (clinical user, B)

'So this low access to information has inhibited user empowerment? *Yes. Nothing much is interactive. Its very rare that anyone would come in and ask for some statistics or a report. In all the years I have been dealing with it there*

have been only two people who have ever asked me that. You see this really stems right back to when the system was first implemented and the staff still basically feel, what the heck is it giving us? Apart from the basic how many patients have we seen in a day. ***So the users don't feel that they are getting any useful information out of the CIS?*** *No' (clinical manager, B)*

From the experiences reported in these five Trusts it would appear that in order to effectively manage and encourage the development of user empowerment, users need to be involved in decisions concerning what data are collected and how they can then access the data through reports. Should users not be involved in this way, then the development of user empowerment is less likely to occur. From the earlier analysis it has been found that both these possible outcomes are considered to have a direct influence on the level of perceived effectiveness associated with the CIS, the former having a positive impact and the latter a negative impact.

In addition, user involvement was also considered useful in helping manage changes in organisational culture during a CIS development project. Informants in Trusts A and C indicated that changes in their Trust's organisational culture had been planned with particular emphasis placed on developing an information culture. To ensure that a Trust's organisational culture becomes more information focused, it was found that it was necessary to change the way staff use and think about information and generally raise the profile of information as a clinical resource (Trusts A & C). To generate these changes the project team in Trust C used high levels of pro-active user involvement to highlight the system's capabilities as a clinical information resource and to ensure that useful reports would be generated from the system. It was suggested that by involving clinical staff it was possible to raise interest in the use of information, that was reinforced as reports became available and so develop an information culture within the Trust. For example, a clinical manager (C) stated,

'I think the pro-active, meaningful involvement of users has been a key element in developing our Trust's information culture. We have emphasised that managers are listening to clinicians' needs and that staff are able to influence change. I think right from the start, we have tried to sell the system to the users,

to get them to see the potential of this new information and how they can use it. I think that has really helped.'

It was also identified in several Trusts that user involvement, as an effective method of managing changes in organisational culture, could be complemented through beneficial effects resulting from high levels of senior management commitment and participation. For example, in Trust B it was found that the commitment from senior managers had resulted in the appointment of a systems champion. The systems champion, who had previously held a clinical position within the Trust, was extremely enthusiastic about using the information that the CIS could provide. Informants stated that his knowledge of, and responsiveness to, clinical needs and general enthusiasm about the system had been integral in raising staff interest in using information and therefore, helping to develop an information culture. In answer to a question asking informants to identify the main treatment approaches adopted to develop an information culture they replied:

'Well I think that you will probably find that as you speak to people that the most significant factor was that the Head of Information was appointed in post. I think the Head of Information was a great help because of his clinical background and that he listened to clinicians' views. He was saying, you advise me, you tell me the things you want us to look at as well.' (manager, B)

'I think the head of information taking a really high profile. He was here, there and everywhere and being prepared to talk and discuss it with people and turn the information around so that it was more meaningful.' (IM&T manager, B)

In Trust A informants also viewed senior management commitment as a foundation for addressing changes in organisational culture. The commitment to providing financial resources for the system, the provision of palmtop computers and a positive, high profile commitment to using information to help inform patient care, emphasised the priority and importance that senior managers were placing on the CIS. This positive message was increasing the credibility of the system among clinical staff and the value associated with the information. The IM&T manager stated that

encouraging an information culture had been an explicit aim for the CIS that had been identified early in the project. The IM&T manager volunteered that a specific example of how the development of an information culture had been treated at Trust A was through the provision of palmtop computers to clinical staff. The IM&T manager (A) stated that

> *'For example, the cultural change is most noticeable where people, who used to work on paper, now use the palmtop to do direct data entry. We have noticed the difference in the way they use information and their commitment to using it and the feedback that they get from it. I think they view the palmtop as a symbol of how things are moving forward, the arrival of information technology if you like, and that has really encouraged the cultural change towards using information.'*

In contrast, the intention to develop an information culture was not considered at the outset of the CIS development project at Trust B. Consequently, changes in organisational culture were left to chance until senior managers decided to appoint a systems champion. Once the systems champion was in place he identified that positive cultural change was crucial to system success. However, by this time it was reported that a more negative 'blame' culture had emerged in some areas of the Trust. Informants reported that it had taken a long time for the systems champion to tackle this negative culture and encourage and develop a more positive, information culture. For example, a clinical user (B) stated,

> *'I think initially when the system came in it was just like everybody felt 'Big Brother' was watching you. All this paranoia and we had to account for every minute of our time. Once we dropped collecting non-patient activity, I think it made a big difference to people. We felt that we were no longer being policed on it. We had quite a lot of reassurance from the Head of Information about things like that, you didn't have to add up every minute of the day.'*

The evidence from Trusts A and B illustrates the effectiveness of certain treatment approaches, such as appointing a systems champion, the provision of palmtop

computers and a positive message from senior managers. The evidence from Trust B also suggests that it is important to assess the potential areas of organisational impact from the outset of a project to offset any uncontrolled negative organisational change.

In addition, the experiences reported at Trust E illustrate how not assessing and effectively managing organisational culture, and relying on positive cultural developments to occur as a natural response to the introduction of a CIS, is unlikely to foster the development of an information culture. Informants in Trust E frequently commented that there was a lack senior management commitment to the CIS project and that this negative attitude was permeating down to all staff throughout the Trust. Consequently, there has been minimal cultural change and user views towards technology have become more cynical. This lack of cultural change was considered by informants to be having a detrimental effect on the CIS because users' perceptions of the CIS were negative. The users did not associate any value with the system or the information that it could provide. For example, informants commented:

> *'I am a firm believer that organisational culture is fed entirely from the top. I don't believe you can bottom up a change in culture. I don't think anything is likely to change while we have got the current senior management structure.*
> *And you think that has had a negative impact on how staff use the system?*
> *Yes.' (IM&T manager, E),*

> *'The culture has been consistent because you have got the same personality in post. Until you change the personality at the top you won't change the culture.' (manager, E).*

Other negative effects that have occurred from a lack of senior management support at Trust E have included low levels of financial support, little interest in attempting to improve and develop the system and the decision not to invest in palmtop computers for clinical staff. The evidence from Trusts A and B suggests that these elements can be particularly helpful in developing a more positive organisational culture and their absence in Trust E, provides additional support for assessing and managing organisational issues during a systems development project.

Planned improvements in the flow of information was another area where senior management commitment and participation was perceived to provide the bedrock for effective management practices. For example, senior management commitment was necessary to ensure the provision of resources to support the project, such as the employment of staff to write reports from the CIS (A) or through the provision of look up devices and printers to allow staff greater accessibility to information (B & C). These elements were identified by informants in three Trusts (A, B & C) as facilitating an improvement in the information flow and thereby ensuring a positive organisational impact.

Changes in clinical working practices were also addressed in two Trusts using methods that had their roots in high levels of senior management commitment. In both Trusts A and C, changes in clinical working practices had been planned at the outset of the development project and it was acknowledged that these changes would need to be effectively managed throughout the project. For example, in Trust C, the appointment of a clinical development advisor was considered a key element of managing changes in clinical working practices. The clinical development advisors role was to *'look at clinical issues and encourage the users to develop and improve their clinical practices'* (senior clinical manager). Consequently, users were more inclined to make use of the CIS to improve their working practices, because of having the clinical development advisor to demonstrate the potential of the system. Furthermore, in Trust A, the commitment to providing palmtops to replace paper data recording was viewed as a *'major plus'* because *'it doesn't take so long to record the information now as it used to and that has been an enormous bonus'* (clinical user).

User training was also identified as a valuable element of best practice that could be used to effectively manage changes in clinical working practices. Informants in two Trusts (A & C) identified user training as a key facilitator in the smooth introduction of new clinical working practices for staff. Particular emphasis was placed on the need for the training to educate staff about the concepts behind the new working practices as well as teaching them how to operate the system. The IM&T manager at Trust A stated,

> *'I'm not training them about which keys do I press, I could get a technician to do that, it's a dialogue about how they are going to be using information in the future and why they are collecting it in this way.'*

Similarly, a senior clinical manager at Trust C emphasised the importance of the training encompassing wider issues and that it should be ongoing, *'not just for the current system, but also for future developments in the system as well.'* By employing these methods, it was considered at both Trusts A and C that the new clinical working practices had been effectively managed to ensure they helped develop a positive organisational impact from the CIS.

The results reported strongly suggest that best practice factors have provided the foundation in several Community Trusts to effectively address and manage organisational issues to ensure a positive organisational impact. The consideration of organisational issues in the systems development process has been found to be helpful in encouraging positive changes in a Trust's organisational culture, higher levels of user empowerment, improvements in the flow of information and improvements in clinical working practices. Therefore, the adoption of these approaches are considered to be ensuring that the introduction of a CIS results in a positive organisational impact. Similarly, the experiences of some Trusts, B and E in particular, show how not assessing and managing organisational issues, from the start of a CIS project, can lead to a negative organisational impact that can have a detrimental effect on the overall success of the CIS.

7.3.4 The Role of User Ownership and Positive User Attitudes in the Successful Adoption of a CIS

This section is devoted to exploring the relationship between user ownership, user attitudes and success. In addition it specifically addresses the key treatment approaches that have been proposed to effectively manage these variables during a systems development process.

The Relationship Between User Ownership and System Effectiveness

From the results of the cross case analysis it was clear that there was a mixed experience across the Trusts with respect to user ownership, depicted in Table 7.3. In four out of the five Trusts (A, B, C & D) it was found that achieving user ownership had been planned. However, only informants in one Trust (A) said that user ownership was already occurring at high levels. As one clinical user noted:

> *'there is ownership because we use it to inform our clinical practice' (clinical user, A),*

> *'I think it [user ownership] was a deliberate policy by IT and I think the new Head of Information will extend that even further than it is now' (clinical user, A).*

Informants in Trust B provided contrasting views on the occurrence of user ownership indicating that user ownership was perceived to be occurring at high levels in some areas, but not others. For example, whilst the IM&T manager (B) stated:

> *'This is something the Head of Information has been working towards and this process is now beginning, where we are saying this is your system, what do you want us to record? Whereas before they were told what to record'.*

By contrast, a manager (B) suggested:

> *'I don't think staff have ever had ownership of the system and I think that is an extremely important issue'.*

Informants in Trust C stated that user ownership was starting to occur, but only at moderate levels so far, with one manager (C) noting:

> *'We may be a little hard on ourselves but we still don't believe that we have got adequate user ownership'.*

However, in the majority of the Trusts (A, B & C) high levels of user ownership were expected in the future, once greater access to information is provided (A & B) and the CIS is fully implemented (C). By contrast, informants in Trusts D and E indicated that there was little or no user ownership currently occurring. For example, in Trust D the clinical user noted *'it has certainly been useful but I wouldn't have thought of it as our system'*, whilst the IM&T manager at Trust E reflected: *'I think users see it as part of the daily grind of filling in these Daily Diary Sheets and so on and that's it really'*. One manager (E) summarised the situation more bluntly: '*its just a necessary evil*'. However, it was only the informants from Trust E who stated that user ownership had not been planned and was unlikely to occur in the future.

Table 7:3 Level of User Ownership and Positive User Attitudes at each Trust

Variable	Trust A	Trust B	Trust C	Trust D	Trust E
User Ownership	+	≈/-	≈	-	-
Positive User Attitudes	+	+/-	+	+/-	-
Perceived Success	4.0	2.6	3.2	3.4	2.4

Note: + denotes high occurrence of variable, - denotes low occurrence of variable, ≈ denotes moderate occurrence of variable. The overall measure of success is based on a 5 point Likert scale ranging from 1, CIS is very unsuccessful to 5, CIS is very successful.

However, despite the range of experiences in achieving user ownership, there was a clear consensus across informants, in all Trusts, of the importance of user ownership to the ultimate success of a CIS. In three of the five Trusts (A, B & C) user ownership was identified as having particular importance in avoiding failure with informants making the following comments:

> *'The Trust is very reliant on user ownership because it is a Community Trust and staff are very decentralised. If the staff, the clinicians on the ground, don't own the system, it would be a complete failure' (clinical user, A),*

> *'Achieving user ownership will be the deciding factor of whether they use the system or not' (IM&T manager, B),*

> *'If they [Clinical Staff] don't get ownership they will rely on non-clinical*

people trying to tell them how to use it which won't work '(IM&T manager, C).

It was interesting to note that the importance of user ownership was also recognised in Trust E, with a clinical manager commenting that: '*the Trust needs to encourage user ownership'*, even though all informants from the Trust recognised that they had not experienced user ownership.

More specific benefits from achieving user ownership were also identified by respondents. For example, the IM&T manager (A) stated that: '*having user ownership has meant that users are in control of their information*', and a clinical user (A) noted that:

'Ownership is about recognising and seeing the potential to develop things that are going to be clinically useful. Without the ownership you wouldn't be getting the ideas being generated and pushing the development of it [CIS] which in turn is improving patient care'.

Similarly, the IM&T manager (C) stated that:

'I think once they [clinicians] own it they will try and optimise its use and they will try and explore different ways in which the system can be used to improve the service'.

The importance of attaining user ownership has also been highlighted by the experiences of those Trusts that failed to achieve it. As a manager from Trust B noted:

'Without ownership of the data they [clinicians] don't feel they are involved or they are controlling it then we are going to have problems with the quality'.

Similar views were expressed at both Trusts D & E. For example, the IM&T manager (D) stated that:

'I think the main problem is the quality of the data. They are not interested in

what is going in so the quality is poor. That then undermines the quality of the reports that are pulled off'.

Similarly, a clinical manager (E) noted:

'Its not worthwhile entering the data from their [clinicians] point of view, they can't access the data and not being able to get the answers that they want further increases the amount of cynicism associated with the system'.

The relationships that have been identified above clearly provide strong evidence to suggest that there is a relationship between user ownership and success. Furthermore, it has been demonstrated that the relationship can have either a positive or negative effect on the overall perceived success of a CIS, depending on how well user ownership is addressed during the systems development project.

The Relationship Between User Attitudes and System Effectiveness

The cross case analysis of user attitudes indicated that all Trusts planned to develop positive user attitudes during the development, implementation and use of their respective community information systems. The range of user attitudes recorded at different Trusts is presented in Table 7.3. Informants at Trusts A and C stated that user attitudes were positive towards the CIS and that this positive attitude was thought likely to continue in the future. More specifically, the following examples were cited as evidence of positive user attitudes: an increased demand for reports (IM&T manager, A, clinical manager, C); efforts by users to improve data quality (IM&T manager, A); and general positive comments about the CIS during staff meetings (clinical user, A, clinical manager, C). Furthermore, in Trust C it is envisaged that the planned increases in access to information will further develop and enhance the users' positive attitudes. As one clinical user (C) commented:

'We are going to get more out of the system for our [the clinical staff] benefit looking at what we do in terms of monitoring things on various diagnoses and incidents'.

Informants at Trusts B and D gave mixed responses as to whether they perceived user

attitudes to be positive, indicating that there was a variation in perceptions towards the CIS across these Trusts. However, the IM&T manager (B) did expect user attitudes to be more positive in the future commenting that:

> *'once we get the printers out there and the users start using the system and they start asking for more information it is going to be a great deal easier to give users information'.*

Only informants at Trust E stated that although attempts had been made to develop positive user attitudes, at the time of interviewing attitudes were not positive and they were unsure whether attitudes would improve in the future. It was perceived by informants in Trust E that clinicians only considered their interaction with the system to be a mandatory routine that provided no personal benefit. Specific comments included:

> *'It's just what they call a necessary evil because of Billing (manager, E)',*

> *'Positive is not the right word. It is part of a thing that we have to do, so we do it' (clinical user, E),*

> *'The users tend not to ask for information. A lot of them don't seem to be interested (IM&T manager, E).*

The quality and availability of the information output was perceived as being key to the attainment of positive user attitudes:

> *'The single most important factor is that we have access to the information' (clinical user, A);*

> *'I think in terms of report writing, people are now coming to me and saying, can I get this information? How is this done? That is the best news, that they are taking it seriously and thinking maybe I can do something with it' (clinical user, C);*

'I think there is a lot of evidence of positive user attitudes in the way people have adapted to using the system. Where it [CIS] has been a success they [clinicians] are starting to get ideas for the development of the system and people are starting to look at the information in terms of what can be collected' (senior clinical manager, C);

'If you could get meaningful information out, then I think it would fire them up and they would be interested' (manager, E).

There was general agreement, from informants in all Trusts, that there is a significant relationship between user attitudes and success. For example, it was noted that once positive user attitudes had been attained, there were significant resultant benefits with respect to the quality of the data input. As one clinical user (A) noted:

'I think the biggest benefit is staff are motivated to record and reflect what we do accurately'.

This view was endorsed by the IM&T manager (A) who noted:

'They are committed to doing it [record information] and they are committed to ensuring that their colleagues also do it [record information] and record accurately'.

These views were echoed by an IM&T manager from Trust B who noted:

'It has made the user more responsible for feeding the data in on time and correctly'.

Conversely, in Trust E where positive user attitudes were not identified, there have been severe problems with data quality. The IM&T manager (E) states that:

'generally the staff aren't very interested in the activity once they have done it,'

and as a result, 'we discovered that anything that we try to get from it [CIS] was corrupted by poor data quality and I think we went into a little bit of despondency then.'

The negative impact of failing to achieve positive user attitudes was also recognised in Trust D, with the IM&T manager noting that staff:

'Always blame the system for the errors, it's never their own errors that have caused the problems.'

The above findings suggest that information and data quality may be inextricably linked to the attainment and retention of positive user attitudes. In three Trusts (A, B & C) where information quality and accessibility were perceived as being high, positive user attitudes have resulted. This in turn encouraged the users to be more attentive to the quality of their data input, which ultimately enhanced the effectiveness of the system. Conversely, in Trusts D and E, where there has been poor quality in terms of the information output then this has contributed to negative user attitudes, which ultimately undermined the perceived success of the CIS.

The Management of User Ownership and User Attitudes

During the interviews, informants were also asked to discuss the main management approaches that had been adopted in their Trusts to achieve user ownership and positive user attitudes. A range of approaches were identified by informants and as in the case of managing organisational impact, the foundations for these approaches were certain best practice variables, exhibited in Figure 7.3. For example, in Trust A it was highlighted that high levels of senior management commitment had led to the provision of resources, which facilitated the delivery of regular, relevant reports to clinical staff and ultimately encouraged ownership (clinical user, A). User involvement and user training were also cited as being facilitators for developing user ownership with a clinical user at Trust A stating that:

'We are using the CIS to support our clinical issues and I think that is because of the involvement of clinicians right from the very start' (clinical user, A),

> *'I think people who went to the training sessions came out recognising that they would have to implement something that was going to be valuable to them in their clinical practice so the focus and the message from the training was very much to do with ownership.' (clinical user, A).*

Best practice variables were also identified as facilitating user ownership at Trusts B and C with senior management commitment resulting in the appointment of a systems champion (B) and making a concerted effort to give out a positive message that the CIS is for clinical staff benefit (C); user involvement demonstrating that the CIS is for staff benefit and allaying fears of users (C); and training had helped introduce the users to the concepts behind using the information that will be available from the CIS (C).

However, as well as being effective treatment approaches the lack of certain best practice variables had also been identified as being a significant inhibitor to the development of user ownership. Low levels of senior management commitment and participation have been identified as the direct cause of clinicians having low access to information resulting in low user ownership, (D & E), as have low levels of user involvement resulting in the CIS being seen as being imposed on clinicians rather than for clinical needs (E), and staff not being involved in deciding what information is collected so staff do not perceive the information to have any value for them (D & E). As well as affecting the development of user ownership informants also indicated that user attitudes were also frequently influenced through the adoption of best practice variables. The importance of having a well balanced project team in developing positive user attitudes was identified in Trusts A, B and C with informants stating that:

> *'I think the thing that has been most important is having somebody with a clinical background. I have a clinical background and I think the thing that has made the difference is that clinicians have faith in you because they think you understand what you are doing,' (IM&T manager, A)*

> *'I think they [clinicians] had more of an affinity with the Head of Information because of his clinical background. I think they felt he was one of their own and their needs would be understood and their requirements would be addressed.' (manager, B)*

> *'The fact that we have got a Clinical Development Advisor in place is helping to develop the system as well which from a clinician's point of view is excellent' (clinical user, C).*

Similarly, good management of user expectations (A and C) and good quality user training with friendly staff, (A, C & D) were also cited as directly contributing to positive user attitudes.

It was also significant to note that as in the case of user ownership, not adopting certain best practice variables was also perceived to directly inhibit the development of positive user attitudes. A lack of senior management commitment to using information, low levels of training for clinicians and not realising user expectations were all identified at Trust E as having a negative effect on user attitudes and similar problems in terms of managing user expectations were also cited as causing poor user attitudes at Trusts B and D. In addition, low senior management commitment at Trust D resulted in low levels of resource provision for the CIS and frustration among clinical users which was also cited as directly contributing to low user attitudes.

This evidence suggests that best practice variables have a dual role in systems development projects. Not only do they have a direct relationship with the perceived level of success associated with the CIS but they are also important facilitators for managing and developing user ownership and positive user attitudes, both of which are perceived to have a positive relationship with system success. An overview of the relationship between the adoption of best practice, the attainment of user ownership and positive attitudes and their resultant impact on system's success is presented in Figure 7.3.

The Relationship Between Organisational Impact and User Attitudes

As well as having a direct relationship with success, organisational impact was also identified in some Trusts as influencing user attitudes. It was noted in several Trusts that there was a relationship between user attitudes and changes in organisational culture (C, D & E), improvements in the flow of information (A & B) and changes in non-clinical working practices (A). The most common relationship was between organisational culture and user attitudes and it was perceived that culture could either have a positive or negative effect on user attitudes. It was noted by one informant that during the implementation of the CIS the change in organisational culture had reduced the previous negative 'blame' culture and that efforts were now being made to focus more on praising staff for their work. Consequently, the staff have become more relaxed and have a more positive attitude both towards the CIS and to their work in general (clinical manager, C). This is in contrast to Trust B where staff were initially suspicious of the CIS and were concerned that it was a policing tool with staff being reprimanded if they made mistakes (clinical manager, B).

Other negative effects on user attitudes from organisational culture were also recorded from Trusts D and E. An informant stated that the culture of their organisation was such that clinical staff intensely disliked collecting information as it was perceived to detract from their primary role of delivering care to patients (IM&T manager, D). Consequently, the staff have a negative attitude towards collecting information either through paper or through the CIS. In Trust E the culture of not using information was reinforced by senior management which merely served to compound the negative attitudes of clinical staff towards information and the CIS, staff soon losing interest in the system once it had been implemented (IM&T manager, E).

However, it was noted by informants that other organisational impacts could result in positive user attitudes. Improvements in the flow of information meant that users felt that they were less likely to be overcommitted which helped to raise morale (clinical user, A) and the users could now see the data they were entering as having a practical use, either for management or for themselves, which encouraged a greater sense of value associated with the CIS (IM&T manager, B). In addition practical benefits

resulting from changes in non-clinical working practices such as a reduction in paperwork were also thought to be helping in developing positive user attitudes towards the CIS (clinical user, A).

The discussion above and in the previous sections indicates that organisational impact is perceived to have a direct influence on both the ultimate success of a CIS and user attitudes that in turn directly influence the success of a CIS. However, with regard to the relationship between organisational impact and user attitudes it is possible that this relationship may have a mutual influence. In other words, user attitudes towards the CIS may also influence the level of organisational impact experienced. This relationship was not explicitly explored during the research interviews although its existence was suggested by one informant who stated:

> *'I think there has been a general change in organisational culture. The clinicians have become more relaxed and more positive in their attitudes. I think the two go together' (clinical manager, C).*

Consequently, it would appear that both user attitudes and organisational impact could be influencing one another and depending on the outcome, having a positive or negative effect on the perceived success of the CIS. This result further emphasises the need for the organisational impact resulting from the introduction of a CIS to be managed during a systems development project.

The recognition that user attitudes can be influenced by the level of organisational impact provides additional evidence to support the assertion that they are a distinct variable, separate to both organisational impact and best practice. The relationships between organisational culture, changes in the flow of information and changes in non-clinical working practices and user attitudes indicate that user attitudes transcend the three stages of development, implementation and operation of a CIS and have a crucial role in the ultimate level of perceived success associated with the system. Figure 7.4 provides a summary overview of the relationships between organisational impact and success and organisational impact and user attitudes.

7.4 SUMMARY

This chapter has presented the results of the cross case analysis of data collected from five Community Trusts. The analysis has addressed each of the study's overall research objectives in turn and has identified several key variables and relationships that appear to influence the ultimate level of CIS success.

The relationship between best practice and CIS effectiveness has been investigated and the results of the analysis indicate that senior management commitment and participation, user involvement and user training all directly contribute to the level of effectiveness associated with the system. Similarly, the relationship between organisational impact and CIS effectiveness has also been investigated. In this case, four areas of organisational impact were identified as having a direct influence on the level of system effectiveness, these being: changes in organisational culture, such as developing an information culture; user empowerment; changes in the flow of information; and changes in clinical working practices.

Having established that there was a relationship between the level of organisational impact and system effectiveness, the analysis then focused on determining the most effective methods to ensure a positive organisational impact occurred. The results indicated that organisational issues had to be assessed and effectively managed in order to achieve a positive impact and that best practice variables provided the foundation for addressing these issues. For example, senior management commitment, user involvement and user training were all found to be the basis for effective management practices to ensure positive changes in organisational culture, empowerment and clinical working practices. These findings suggest that key best practice variables may perform a dual role during a systems development project, directly influencing the level of system success but also as the bedrock for addressing organisational issues and thereby ensuring a positive organisational impact. The results also suggested that for the effective consideration of organisational issues, these issues need to be assessed and effectively managed from the *outset* of the development project.

The cross case analysis also investigated the role of user ownership and user attitudes

in the successful development, implementation and operation of a CIS. The findings indicated that both these variables were found to have a direct influence on CIS effectiveness; higher levels of these variables leading to higher levels of system effectiveness. However, it was observed that both user ownership and user attitudes were conceptually different to the other two groupings of best practice and organisational impact variables. The key difference was that both user ownership and user attitudes were considered to be influenced throughout the development and operational phases of a system's life. However, there was a similarity between these variables and organisational impact in respect of the management practices proposed to ensure the development of both user ownership and positive user attitudes. For example, senior management commitment, user involvement, user training and a well balanced project team were all considered important elements needed to develop high levels of both variables. In addition, the relationship between organisational impact and user attitudes also provides further evidence to suggest that both of these elements need careful management during a development project to ensure that they have a positive impact on system success.

The following chapter provides a discussion of the overall findings and conclusions of the study making specific reference to: the other stages of the project; the existing IS literature; and the overall research objectives and framework devised for this research. A series of recommendations for future CIS implementation is also developed.

Chapter 8 : Conclusions - Ensuring Successful Information Systems in the NHS

8.1 INTRODUCTION

In a rapidly changing and ever more challenging organisational environment, where information technology plays an increasingly important operational and strategic role, the need for effective information systems development practices has become critical. The findings of this study are therefore of particular importance as they have a number of significant implications for the practice of information systems development and project management from both a healthcare and also a more general information systems perspective. The previous chapter discussed in depth the results of the cross case analysis that studied the relationships between best practice, organisational impact, user ownership and user attitudes and system effectiveness. This chapter discusses the findings from the cross case analysis in the context of the existing IS literature and makes direct reference to the results from the earlier stages of the research project and the overall research objectives of the study.

The chapter begins with a general summary of the study's findings and their contribution to existing knowledge. In the following sections, these findings are discussed in terms of their implications for researchers and practitioners in the field of IS. The chapter concludes by identifying possible limitations and outlining avenues of

future inquiry within this area.

8.2 SUMMARY AND CONTRIBUTION OF RESEARCH FINDINGS

As was indicated in chapter five, section 5.6.2 the research objectives for this study were:

1. To explore the relationship between the actuality of a CIS project team to adopt best practice and the resultant level of success or failure of the operational information system;

2. To explore the relationship between the level of organisational impact brought about by the system and the resultant level of success or failure of the operational information system;

3. To explore how the organisational impacts resulting from the development and implementation of a CIS can be effectively assessed and managed to ensure that they are positive;

4. To explore the relationship between the ability of a CIS project team to develop positive user attitudes and facilitate user ownership and the resultant level of success or failure of the operational information system.

The first two objectives were developed from the literature review and were applied to the exploratory research. A third research objective was developed in the light of the findings from the exploratory research and was applied to the latter two stages of the research, along with the original objectives. The fourth research objective was developed in the light of the findings from the second stage of the research. All four research objectives were subsequently applied to the final stage of the research project. To recap, the first stage of the research project involved an exploratory case study conducted at Central Nottinghamshire Healthcare (NHS) Trust, the Community Trust that was sponsoring the project (reported in chapter four). The second stage comprised a survey of all Community Trusts in England and Wales to confirm that the variables identified in the exploratory research had equal relevance to other

Community Trusts and to test for possible associations between variables (reported in chapter five). The third and final stage of the project involved five case studies, drawn from a representative sample of respondent Trusts that all used the same CIS package. This final stage addressed the variables and associations between variables identified in the survey in more depth (reported in chapters six and seven). In the sections that follow, each of the overall objectives outlined above is discussed in terms of existing knowledge and the contribution of this study's results in furthering understanding in the IS research domain.

8.2.1 The Relationship Between Best Practice and CIS Effectiveness

The multiple case study research has provided strong evidence to suggest that senior management commitment and participation, user involvement and user training all directly contribute to the overall level of perceived effectiveness associated with a community information system. Senior management commitment has been shown to facilitate the provision of resources, the appointment of a systems champion and good project management. Similarly, high levels of user involvement were found to help avoid user resistance and allay the fears of staff while user training helped build staff confidence in using the system. Furthermore, the case studies have identified several additional elements of best practice that are also considered important during a CIS development project. These additional elements consisted of: high levels of user support; rigorous systems testing; management of user expectations; and a well balanced project team.

If these results are considered in the light of the survey results, the findings can be placed in the context of the wider population of Community Trusts in England and Wales. The results indicated that on average the majority of respondent Trusts had experienced active support from senior management, had actively encouraged high user involvement and had provided a broad user training programme that allowed for variations in the skill of the user population. In addition, it would appear that on average the responding Trusts had made extensive support and help available to staff during implementation and had extensively tested the CIS before it was fully implemented. Finally, when these variables were considered in relation to the performance of the system recorded at each Trust, significant positive correlations

were produced indicating a positive association between all the variables and success. These results provide further evidence to suggest that the best practice elements identified in the multiple case study research are also considered important by IM&T managers in the wider population of Community Trusts. The significant positive correlations between senior management commitment, user involvement and user training and success also strongly suggest that the direct relationships identified in the case study Trusts are being repeated in other Trusts across England and Wales. These results are particularly important as they confirm that the identification and successful adoption of key elements of best practice are likely to engender higher levels of CIS success.

If the overall results of this study are considered in relation to the wider, existing IS literature, it can be noted that the same best practice variables have been found to be crucial in successful systems development projects. For example, researchers have noted that high levels of senior management commitment can ensure that a systems development project receives adequate resources (Sauer, 1993; Ewusi-Mensah and Przansnyski, 1994); can result in the appointment of a systems champion (Lockett, 1987; Beath, 1991) and can facilitate good project management (Willcocks, 1994).

Similarly, user involvement has also been identified in separate studies as being crucial to system success. High levels of user involvement have been found to reduce user resistance (Carnall, 1986); can improve the quality of the system arising from more accurate user requirements (Damodaran, 1996); can increase user commitment to system success by allaying users' fears; and can also lead to improvements in user satisfaction (Wong and Tate, 1994).

User training has also received considerable attention in the literature and its direct relationship with success has been identified in several studies (for example: Brady, 1967; Moran, 1981; Miller and Doyle, 1987; Cronan and Douglas, 1990; Hornby et al., 1992). It has been reported that high levels of training have been found to correlate with: high levels of system usage (Fuerst and Cheney, 1982); more positive user attitudes towards the system (Lucas, 1975; Maish, 1979) and improved user perception of job motivation resulting in greater satisfaction (Yaverbaum and Culpan,

1988; Nath, 1989).

In addition, high levels of user support (Miller and Doyle, 1987; Govindarajulu and Reithel, 1998); rigorous systems testing (Chen and Gough, 1995; Ennals, 1995; Flowers, 1997); management of user expectations (Doherty et al., 1998); and a well balanced project team (Chen and Gough, 1995; Whyte and Bytheway, 1996) have all been cited in the literature. Consequently, the findings of the study support existing theory concerning the positive relationships between the best practice variables identified and the levels of system success.

However, despite the large amount of best practice literature that supports these recommendations, the study has also shown that there remain a significant number of Community Trusts that still seem unable to fully adopt these elements. So why are some Community Trusts still finding the adoption of best practice an unattainable aim? It is suggested that one reason may be the lack of control that a systems development team has over the level of senior management commitment and participation associated with a CIS project. For example, if a project is suffering from a lack of support and commitment from senior managers, it would be difficult for a project manager to increase this support because they are likely to hold a subordinate position and the fact that it is inherently difficult to reverse established opinions. Low levels of senior management commitment may also influence the level of meaningful user involvement and management of user expectations that occurs during a systems development project. The project requires ongoing commitment in terms of finance and human resources to ensure that high levels of both these factors are achieved. Consequently, low levels of senior management commitment may have a detrimental knock-on effect in terms of these other best practice variables.

The data from the multiple case studies provides some support for this explanation with those Trusts that have low levels of senior management commitment and participation (D and E) experiencing low levels of system performance. It is also interesting to note that these Trusts are also experiencing either low or token levels of user involvement that is also thought to be having little positive effect on the level of system effectiveness. These results are in contrast to Trusts A and B, that have

experienced high levels of senior management commitment throughout the project, and have correspondingly high levels of all other best practice variables.

Whatever the reason for the low uptake of best practice in some Community Trusts, this research provides an important contribution in a number of respects. Existing studies that have studied the relationship between best practice and system success have rarely been conducted in a single organisational sector using a common type of information system and can be undermined by the confounding factors of sector and system. The research strategy adopted in this study has enabled these confounding factors to be minimised because the study concentrates on a homogenous organisational sector using a common type of information system. Furthermore, the confounding factor of system design is also reduced in the final stage of the research project because a system designed and supplied by a single company, Systems Team plc, has been targeted. Therefore, the findings, with regard to the first research objective of this study, provide a significant contribution because they:

1. Provide a detailed and in-depth understanding of the relationships between best practice variables and success in the under-researched community healthcare context;

2. Identify the key elements of best practice that are considered important and are thought to directly influence CIS success;

3. Take into account, and are therefore less likely to have been influenced by, confounding factors.

8.2.2 The Relationship Between Organisational Impact and CIS Effectiveness

The multiple case study results also provide a useful starting point in discussing the relationship between organisational impact and success. These results have highlighted several specific areas where organisational impact is considered to have occurred that include: changes in organisational culture; user empowerment; changes in the flow of information; and changes in clinical and non-clinical working practices. Of these areas, only changes in non-clinical working practices were not considered to

be directly contributing to the level of effectiveness associated with the CIS. The development of an information culture has led to greater interest from staff in using the CIS and facilitated improvements in clinical efficiency. Positive changes in the flow of information, specifically through increased data quality, the provision of relevant reports and reductions in paperwork and increased user empowerment have helped staff review and improve their clinical working practices that in turn have improved the delivery of patient care. Consequently, staff associate a greater sense of value and usefulness with the CIS leading to a positive perception of overall system effectiveness.

If these results are placed in the context of the survey results the importance of these findings can be considered in wider terms. The average responses from responding Trusts suggested that there had been significant impacts in terms of changes in non-clinical working practices, user empowerment and the flow of information. In addition, when these results were compared with the overall level of CIS performance reported in each Trust significant positive correlations were identified between: user empowerment and success; organisational culture and success; and clinical working practices and success. Furthermore, significant negative correlations were produced between: a CIS ***not*** improving the flow of information and success; and clinical staff still keeping paper records and success. These results suggest that the direct relationships between the organisational impact variables and system effectiveness identified in the multiple case studies are also being repeated in those Community Trusts that have experienced some degree of organisational impact.

It has been noted in the existing literature that the implementation of an information system can cause organisational impacts and Davenport (1994) proposes that developing or changing a company's information culture is the most reliable solution for successful IT implementation. It was found in the cross case analysis that the development of an information culture had contributed to system effectiveness with users more inclined to use and demand more reports from the CIS (A and B). Similarly, Davenport (1994) also notes that merely introducing a new information system will not, by itself, change an organisation's culture. He states that many information managers still operate under a misguided view that, '*once the right*

technology is in place, the appropriate information sharing behaviour will follow.' This misguided view may have been manifested at Trust E, as the introduction of the CIS had little associated management support to develop a new information culture and consequently, the technology has only served to reinforce existing behaviours.

Similarly, several studies have found that developing user empowerment can have a positive impact on system success (for example: Markus and Robey, 1983; Holmes and Poulymenakou, 1996; Wareham et al., 1998). Hammer and Champy (1993) found that by increasing user empowerment companies can gain considerable benefits in terms of increased efficiency and increased motivation from their workforce. Similar benefits were found to be occurring in both Trusts A and C where increased empowerment has allowed clinicians to review their working practices and improve clinical efficiency. The case study results also provided evidence to suggest that where empowerment does not occur, users associate little value and are not motivated to use an information system. These results complement work by Baxter and Lisburn (1994) who identify a relationship between empowerment, user motivation and system performance.

It has been shown by existing studies that user empowerment is closely linked with changes in the flow of information (Lyytinen and Hirschheim, 1987; Sauer, 1993). Empowerment can either be inhibited or facilitated depending upon how information flows change within an organisation following the implementation of an information system. Similarly, changes in the flow of information may result in a redistribution of power that is unacceptable to some stakeholder groups. Although these links were not explicitly identified by case study informants, several examples of clinical staff having more 'power' in negotiating resource levels and defending their service were provided during the interviews. Consequently, the findings of this study suggest that improvements in the flow of information may also help develop user empowerment as well as directly contributing to perceived system effectiveness.

Finally, the findings of the study also provided evidence of clinicians improving their clinical working practices as a result of new information available from a CIS. These improvements in working practices were thought to be having direct benefits for the

delivery of patient care, either through better resource allocation or through more informed clinical practice. Eason (1988) suggests that employees' work may be enriched by the introduction of computers and Bjorn-Anderson et al. (1979) found this to be the case when bank clerks started using a new information system. The results from the Trusts that recorded significant changes in clinical working practices (A & C), suggest that a similar process of enrichment may be occurring. For example, following the introduction of a CIS it was reported that some clinical staff were working in a more informed way (IM&T Manager, A). It is suggested that the new access to information is allowing clinical staff to provide a better level of patient care that is more rewarding for both the clinician and the patient. Consequently, the clinicians may feel that their working practices have been enriched because they are able to provide a better quality service. Bjorn-Anderson et al. (1979) found that the 'enrichment' of working practices can have clear organisational benefits, such as increased job satisfaction from employees and Eason (1998) suggests that this process is likely to encourage system success. Furthermore, Clegg et al. (1996) suggest that changes in job design should be specifically addressed early in the development of a computer-based system to ensure that the organisation benefits from positive changes in job design.

In reviewing this study's findings it can be seen that there is evidence to suggest that there is a relationship between those Trusts that experience high levels of organisational impact and the resultant level of system success. This result is interesting in the light of the published research. The literature suggests two conflicting outcomes when a systems deployment engenders significant organisational change. Firstly, previous studies by Marcus and Robey (1983) and Cooper (1994) indicate that IT-induced organisational change is likely to result in user resistance and possibly system rejection. These views are supported by Wijnhoven and Wassenar (1990) who note that *'when systems features and their organisational context are strongly different, a conflict was probable.'* It can, therefore, be concluded from these studies that projects with a high organisational impact are extremely high risk due to the likelihood of user resistance.

By contrast, writers such as Venkatraman (1991) and Ahn and Skudlark (1997)

suggest that by using information technology as a catalyst for organisational change and process improvement it is likely to realise greater benefits than simply automating what already exists. The results presented in this study tend to support this latter position, as they indicate that high levels of organisational impact are associated with high levels of system success (from the survey results) and that there is a direct causal relationship between these two issues (from the multiple case study results). There are two possible explanations as to why organisational impact appears to be having a positive rather than a negative effect on system effectiveness.

Firstly, in the cited examples where user resistance has been engendered by organisational change, the organisational impact has been typically unexpected, whereas in the research that encourages IT-induced organisational change, the impact is planned. If these observations are compared to the multiple case study results it can be seen that those Trusts whose instances of change were planned, believed that their systems were more effective. For example, it was stated by informants in Trusts A and C that changes in organisational culture and user empowerment were explicitly planned and that both these changes had led to a positive organisational impact and high levels of system effectiveness. In contrast, informants in Trusts D and E stated that changes in organisational culture and user empowerment practices had not been planned and that little change was occurring in these areas. Informants in these Trusts reported that insignificant changes in organisational culture and user empowerment had meant there had been little organisational impact and that this low impact was having a negative effect on the overall level of CIS effectiveness. For example, the low changes in organisational culture and lack of user empowerment resulted in the users perceiving the CIS to have little value in their day-to-day work. These findings would suggest that it is important that organisational impact is both planned and managed in order to ensure that the organisational impact has a positive effect on system success. The nature of the treatment approaches available to CIS developers are discussed in the following section.

The findings presented in this section also provide a number of important contributions. Existing studies have tended to focus on single areas of organisational impact rather than addressing the wider concept of organisational impact and its

relationship with system success. In addition, there has been very little empirical research conducted studying these issues and their importance in successful systems development projects and no previous research addresses these issues in the context of community healthcare. Consequently, the findings, with regard to the second research objective of this study, provide a significant contribution because they:

1. Provide a detailed and in-depth understanding of the relationships between the different variables that contribute to organisational impact and the ultimate levels of system effectiveness;

2. Provide further evidence to suggest there is a direct positive relationship between the level of IT-induced organisational impact and system success in the context of the under-researched community healthcare sector;

3. Take into account, and are therefore less likely to have been influenced by, confounding factors.

8.2.3 The Methods of Treating Organisational Issues to Ensure a Positive Organisational Impact

When considering the organisational impact resulting from the implementation of a CIS, a range of issues need to be assessed and effectively managed in order to ensure that the resultant impact is positive. During the analysis of the in-depth interviews conducted in the final stage of the research it was found that the approaches CIS development teams were using involved three best practice variables as the foundations for these methods. Senior management commitment and participation, user involvement and user training were all identified by informants as essential starting points for the effective management of organisational issues. This effective management could in turn facilitate the development of high levels of user empowerment; improvements in the flow of information; positive changes in organisational culture; and improvements in clinical working practices.

It was found that senior management commitment and participation was important in providing financial resources for the system, the provision of appropriate technology

such as palmtop computers and a positive, high profile commitment to using information to help inform patient care. These resources and positive messages were considered to be particularly helpful in encouraging and developing positive changes in organisational culture and positive changes in the flow of information (A and C). In addition, user involvement and user training were found to have contributed to managing user empowerment and positive changes in clinical working practices (A and C): the former through users influencing and controlling the composition of the data set and ensuring that regular reports were produced; and the latter through providing training that educated staff about the concepts behind the new working practices. In addition, it was noted that in those Trusts that had planned for and managed specific areas of organisational impact, such as changes in culture (A and C) and changes in clinical working practices (A and C), these impacts were having a positive influence on system effectiveness.

Conversely, in those cases where organisational issues were not considered during a development project, it was reported that there had been little change in clinical working practices, user empowerment or organisational culture (D and E). Furthermore, informants in these Trusts also reported low levels of senior management commitment and user involvement. It is suggested that the decision not to assess and manage organisational issues, through the adoption of senior management commitment and user involvement, resulted in an unforeseen, unmanaged and ultimately undesirable organisational impact at these Trusts.

If these results are compared to the survey results concerning best practice variables as possible management approaches for organisational issues, presented in chapter four, some interesting observations can be made. The correlations indicated that there were significant associations between user support and user involvement, and user empowerment, the latter association supporting the relationship identified at Trusts A and C. User involvement is also significantly correlated with changes in organisational culture, as is user training and senior management commitment, that provides further support for the management practices identified at Trusts A and C. Consequently, the survey results provide evidence to suggest that the relationships identified in Trusts A and C, between key best practice variables and organisational

impact may also be occurring in other Community Trusts. There is a need, however, for further research to investigate the precise nature of these relationships in other Community Trusts.

These findings are of particular interest because they identify an added dimension and value to the adoption of key best practice variables. Although previous research has identified the relationship between senior management commitment and success (Sauer, 1993; Ewusi-Mensah and Przansnyski, 1994) less explicit attention has been given to the role of senior managers addressing organisational issues which ultimately facilitate a positive organisational impact. Existing studies have implied that senior managers are ideally positioned to help develop a positive organisational culture (Barrett, 1992) and user empowerment (Wareham et al., 1998) but the importance of senior management commitment in this respect, has not yet been recognised in the existing 'best practice' literature. This observation is in contrast to user involvement and user training, both of which have been identified as providing the basis for the effective management of organisational culture and user empowerment.

It has been argued by Hornby et al. (1992) that many systems analysts assume that by involving end-users they will have implicitly addressed all the *'salient organisational and human issues'*. Specifically, user involvement has been found to help manage the interaction between an organisation's culture and an information system (Morieux and Sutherland, 1988) through the introduction of informal user groups and emphasising a user-led approach to informatization (Barrett, 1992). In addition, Damodaran (1996) suggests that effective user involvement can help to empower all levels of users and, Carroll (1997), in his study of midwives during an information system implementation, argued that user empowerment was facilitated by *'active involvement from key representatives from the user community'*. Similarly, training in small incremental steps, coupled with broader programmes of education and staff development have been found to be effective in managing organisational culture (Barrett, 1992; Morieux and Sutherland, 1998) user empowerment (Carroll, 1997) and changes in working practices (Eason, 1988). Consequently, it would appear that best practice factors can play a dual role during a systems development project: directly influencing systems success and as the basis for effective management of

organisational issues to ensure a positive organisational impact.

Although these relationships have been identified in the literature, existing studies have tended to concentrate on *single* organisational issues and how they can be effectively managed. Previous studies have not attempted to explicitly study how the adoption of best practice variables can help manage a *variety* of organisational issues during a systems development project. Neither have existing studies attempted to investigate the precise nature of the relationships between best practice variables and organisational issues and how the management of these issues can facilitate a positive organisational impact. The findings of this study, therefore, provide an important contribution to existing research because they:

1. Provide an in-depth understanding of the relationships between best practice variables and organisational issues with particular reference to how best practice variables can provide the foundation for the effective management of organisational issues during systems development;

2. Develop this understanding in the context of managing multiple organisational issues with multiple best practice variables during a systems development project to ensure a positive organisational impact.

8.2.4 The Importance of User Ownership and Positive User Attitudes to System Effectiveness

The cross case analysis also allowed the concepts of user ownership and positive user attitudes to be explored in more depth. The findings from Trusts D and E support the observations made by several studies that identify a direct relationship between a lack of user ownership and poor information system performance (Markus, 1983; Beynon-Davies, 1995; Clegg et al., 1997a). Furthermore, the findings from Trust A supported the assertion made by Van Alstyne et al. (1995) that user ownership is likely to be associated with more successful information systems. Similarly, the findings also supported the assertions that positive user attitudes are likely to influence user behaviour and therefore the success of an information system (Lucas, 1978; Lucas, 1981; Zmud, 1983; Ginzberg et al., 1984; Joshi, 1990). Consequently, the findings provide additional evidence to support the argument that both user ownership and

positive user attitudes are crucial in determining the ultimate level of success of a systems development project.

Furthermore, the findings suggest that both user ownership and user attitudes should be explicitly managed during a CIS development project as they have a significant influence on the eventual success of the system. The findings indicated that the three best practice elements identified as management approaches for organisational impact, were also useful in effectively facilitating user ownership and positive user attitudes. Senior management commitment, active user involvement and appropriate user training were all found to be effective approaches for developing user ownership and encouraging positive user attitudes. Similar relationships to these have been identified in the IS literature. For example, Kaye (1990) states that senior management commitment can reinforce positive attitudes from the staff towards the project and Lucas (1975) and Maish (1979) have both suggested that user training can encourage more positive user attitudes towards the system. In addition, Damodaran (1996) has argued that user involvement is particularly important in developing user ownership.

Although user ownership and positive user attitudes have been identified in the existing literature their explicit role in successful systems development projects has not been adequately investigated. Little previous research has explored the precise nature of the relationships between these variables and success, and similarly there has been little research that specifically addresses how these variables can be effectively managed during a systems development project to ensure that an information system is successful. Consequently, it is suggested that the crucial importance of these variables to successful systems development projects has still to be widely recognised in existing IS research.

It also emerged from the interviews conducted in the different case study sites that user attitudes could be influenced by certain areas of organisational impact. For example, positive changes in organisational culture (C, D and E), improvements in the flow of information (A and B) and changes in non-clinical working practices (A) were all found to be contributing to positive user attitudes. Similarly, negative changes in

organisational culture were thought to be having a negative effect on user attitudes by an informant in Trust B. These observations provide further evidence to recommend that systems developers explicitly treat organisational issues during a CIS project to ensure that these areas of impact have a positive influence on user attitudes as well as system effectiveness.

It is also interesting to note that while areas of organisational impact were identified by informants as influencing user attitudes, a similar relationship was not identified by informants between these key areas of organisational impact and user ownership. It is possible that such a clear relationship was not identified by informants because user ownership requires more explicit attention during development projects for it to occur than user attitudes. If a project team intends to explicitly address user ownership then it is suggested that this explicit attention is more likely to occur during the development and implementation of a system, than once the system is fully operational. By contrast, it is suggested that users' attitudes can be influenced in both the development, implementation and operational phases of a system's life. Consequently, organisational changes in areas such as culture and working practices may have a greater influence on user attitudes than user ownership. However, before accepting this explanation, more research needs to be conducted into the precise nature of the relationships between best practice, organisational impact, user ownership, user attitudes and system success.

The findings of the study with regard to the fourth overall research objective also provide an important contribution to existing IS research. The findings have provided strong evidence to suggest that both user ownership and user attitudes are crucial elements that influence the ultimate level of success of a CIS, depending on how effectively they are managed during a systems development project. However, the importance of these variables has not been widely recognised in the literature. Furthermore, the findings have also suggested that the methods to effectively manage these variables have their foundations in the key best practice variables of senior management commitment, user involvement and user training. This study, therefore, has provided an important contribution to the IS domain by:

1. Identifying the central role of user ownership and positive user attitudes to successful systems development projects in the under-researched community healthcare context;

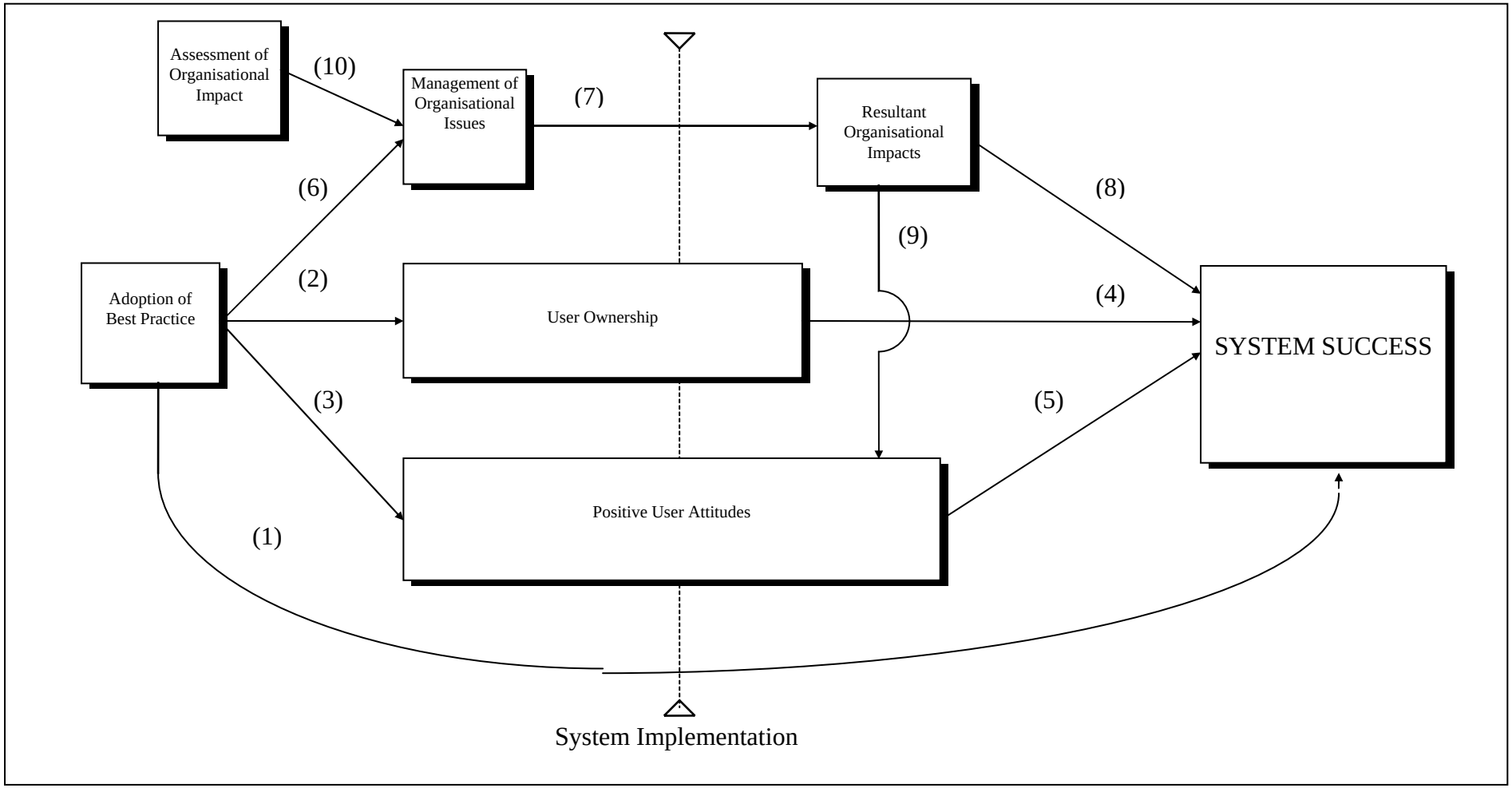
2. Identifying that certain key best practice variables provide the foundations needed to effectively manage these variables to ensure that they have a positive impact on the ultimate level of system success.

8.2.5 Interactions Between Research Objectives

The previous four sections have each taken an individual research objective of the study, concerning the relationships between different factors that influence IS success and highlighted the contributions of the study's findings to IS research. By focusing on each objective in turn, it has been possible to thoroughly investigate the relationships between, best practice, organisational impact, user ownership, user attitudes and system effectiveness and thereby develop a clear understanding of how these variables interact to influence system success. However, by taking this approach, each objective has been treated in relative isolation and it is therefore helpful to reflect on how these relationships may combine to determine the ultimate level of system success. Consequently, these factors have been synthesised into a single model presented as Figure 8.1.

The importance of each of the numbered relationships depicted in Figure 8.1 is briefly reviewed below. From the model it can be seen that the adoption of best practice can have either direct effects or indirect effects through mediating variables, on system success. The study's findings indicated that adoption of best practice can lead directly to system success, most notably through high levels of senior management commitment and participation, active user involvement and appropriate user training (1). Furthermore, these same elements of best practice have also been shown to both develop and encourage user ownership (2) and positive user attitudes (3). In turn, user ownership and positive user attitudes have also been found to directly influence the level of system success (4 & 5) through users having greater control over their information and increased data quality.

Figure 8-1 Interactions of Research Objectives



In addition, best practice was also identified as a foundation for the effective management of organisational issues (6) during a development project which in turn helps ensure a high organisational impact (7). A further important conclusion to be drawn from this study is that such high organisational impacts also have a direct positive influence on system success (8). Furthermore, the findings have also provided evidence to suggest that the resultant organisational impact may also influence user attitudes once the system has been implemented (9), that in turn may influence system success (5). Finally, it has been demonstrated that the potential organisational impact engendered by a CIS must be considered and assessed at the outset of a systems development project in order for the effective management of organisational issues to occur (10). Should this assessment not be conducted, then organisational issues are not addressed and the resultant organisational impact is left to chance, often with highly undesirable results.

The model illustrates why the adoption of best practice is so important in successful systems development projects. It can be seen that best practice can influence system success at four levels, either directly, or through mediating variables such as user ownership, positive user attitudes or positive organisational impact. In the case of the mediating variables, key elements of best practice have been found to be helpful in encouraging and developing user ownership and positive user attitudes. Furthermore, best practice variables have also been identified as providing the foundation for effectively managing organisational issues to ensure that the organisational impact engendered by the information system has a positive influence on system success. However, the model also identifies the importance of reviewing and assessing the potential areas of organisational impact at the outset of a systems development project. Should this assessment process not be undertaken, then it is unlikely that organisational issues will be effectively managed during the development, implementation or operation of the information system. The findings of the study have shown that where organisational impact has not been considered, a low organisational impact has resulted that, in turn, has had a negative effect on system effectiveness. This observation emphasises the fact that while the adoption of best practice is the fundamental prerequisite of systems success, it might not, in itself, be sufficient.

8.3 IMPLICATIONS FOR RESEARCH

The implications of this research project for current and continuing research efforts studying the IS success factors can be divided into methodological issues and theoretical issues. Methodological issues are concerned with the implications of the research design on future empirical efforts. Theoretical issues are concerned with the specific implications of the study's findings for existing theory on IS success.

8.3.1 Methodological Issues

In order to identify the factors which influence community information system success, the key elements of best practice and organisational impact that were considered most important to CIS success had to be studied. The absence of any prior research in this area meant that the study could only use existing theory developed from a range of organisational sectors and test its applicability through the different stages of the research project. The exploratory research provided an initial insight into those best practices and organisational impacts that were considered most important to CIS success at one Community Trust. These variables were then tested for their applicability in the wider context of all Community Trusts in England and Wales. Finally, these variables were then re-examined in more depth at five case study sites before a definitive assessment of the key elements of best practice and organisational impact was undertaken. This assessment provides the basis for a series of recommendations for future CIS implementations that are presented at the end of this chapter.

As a result of this process, the study has developed a measure of best practice and a measure of organisational impact for CIS development projects and therefore provides an important methodological contribution for future studies in this area. It is suggested that future studies specifically target these issues in more depth in other Community Trusts to test whether the relationships identified in the five case study Trusts are being repeated in other Community Trusts, as the survey results suggest. It would also be interesting to compare these measures with measures developed from other areas of the NHS to investigate whether there are common relationships between best practice, organisational impact and system success in all healthcare

sectors.

This research has also provided a significant methodological contribution by identifying the central role of user ownership and positive user attitudes in systems development projects. The identification of these variables is particularly significant as they appear to perform an important mediating role between the adoption of best practice and the achievement of systems success. The importance of these variables to system success does not appear to have been widely recognised in the existing literature and consequently this study has provided a valuable insight into two new issues that affect CIS success. Future research is required to investigate whether the importance associated with these variables in determining system success is repeated in other organisational sectors and in other less labour intensive organisations.

A third key contribution of this study has been to demonstrate how quantitative and qualitative research methodologies can be effectively combined and used to enhance research findings in terms of reliability and validity. It has been argued that combining qualitative and quantitative research methods in IS research can prove useful in building a wider picture of the phenomenon studied (Reichardt and Cook, 1989), can enable the validation of findings (Jick, 1979) and can help in explaining diverging results (Trend, 1989). However, it is noted by Smithson (1991) that *'despite considerable concern over the methodological shortcomings of IS research and the attraction of combining different approaches, the topic is rarely discussed in the IS literature. It would seem that researchers seldom combine approaches, or, if they do, the implications are not highlighted in their reports.'* Smithson continues to suggest that the lack of combined methods in the literature may be due to doubts over the legitimacy or feasibility of combining positivist and interpretive approaches and practical concerns over possible contradictory results from multiple methods. However, Lee (1991) argues that positivist and interpretive approaches can be combined and the more daring researcher may reap significant rewards in terms of more valid findings. Using multiple methods allows the triangulation of findings from different research methods and therefore the construct validity and reliability of the findings can be increased (Yin, 1994).

It is argued that this study benefits from the mixed method approach because the findings of the study have been validated and tested in the light of each stage of the project, allowing further refinement and investigation as appropriate. The research has shown how these methods can be particularly effective when tackling a research area where little prior knowledge exists and ensure that a study remains focused throughout its duration. This study supports the comments made by Kraemer (1991) who has identified that survey research, while being very useful, is greatly improved when used in conjunction with other qualitative research methods. Consequently, this study has highlighted the value of combining both qualitative and quantitative research methods and in so doing provides a methodological contribution to the IS research domain.

A further positive methodological contribution of this study is the fact that specific attempts have been made to take into account the influence of confounding factors. It has been argued that existing IS research, that uses either case study or survey methods, has frequently developed findings from a range of examples in different sectors on a vast range of types of applications (Doherty et al., 1998). Consequently, it is very difficult to determine what proportion of a system's success or failure results from the project team's ability to adhere to best practice and what proportion may be explained by the specific characteristics of the organisation or its environment or by the type of system being developed in terms of its scale or complexity. This study overcomes these weaknesses by targeting: a single organisational sector, the NHS; a common type of organisation, Community Trusts; and a standard type of application of IT developed over a long period of time and still currently being implemented, community information systems. Furthermore, in the final stage of the research a common CIS package from a single supplier is studied, Comwise from Systems Team plc, that allows the additional confounding factor of system design to be controlled. Consequently, it is argued that this study makes an important methodological contribution by employing an approach that takes into account a large number of confounding factors that in turn, enhances the value of the ultimate findings of the study. It is suggested that there remains a need for further research that also adopts this methodological approach, as it facilitates the development of more robust findings that can then be tested in other environments.

A potential drawback in employing so many methods to reduce the influence of confounding factors is that the explanations developed, particularly from the multiple case studies, would not be generalisable to other Community Trusts. However, this problem is overcome to a large extent because of the mixed method research design that this study has adopted. The survey that was conducted during the second stage of the research was targeted at the entire population of Community Trusts in England and Wales. The survey achieved a very high response rate of 58% and therefore provided a valuable source of contextual information about the wider population of Community Trusts and their experience with regard to CISs. Trusts that were chosen for the multiple case studies were tested to see whether they were representative of the responding Trusts. The positive result increased confidence that the findings from the case studies would be applicable to the Trusts that responded to the survey. However, it was also acknowledged that generalisability of the findings would then gradually decrease if they were considered in other areas of the NHS and in the wider IS community.

8.3.2 Theoretical Issues

As well as providing several methodological contributions this study has also expanded on a number of theoretical issues.

Firstly, this study has confirmed that certain key best practice variables have a direct positive relationship with system success within the context of the introduction of a community information system. Consequently, this study has provided additional evidence that supports existing theory and confirms its applicability in the community healthcare context.

In addition, this study has also provided an important contribution by highlighting the importance of several less well documented best practice variables. The study has identified the importance of user support, management of user expectations and having a well balanced project team to systems success. Although these factors have been previously identified in the literature (for example: Miller and Doyle, 1987; Chen and Gough, 1995; Whyte and Bytheway, 1996; Doherty et al., 1998;

Govindarajulu and Reithel, 1998) their role in successful systems development projects may have been underestimated. Consequently, this research has emphasised the importance of these best practice variables in the context of successfully implementing a Community Information System and in so doing has made a useful theoretical contribution to existing IS research. Future research should explicitly address these issues to investigate their importance to system success in other organisational environments.

This study has also provided strong evidence to suggest that there is a relationship between certain key organisational impact variables and success and that greater levels of organisational impact are likely to lead to higher levels of system effectiveness. These findings support the work of Venkatraman (1991) and Ahn and Skudlark (1997) who argue that IT induced change can result in significant organisational benefits that will increase the likelihood of system success. Consequently, this research has highlighted the importance of the organisational impact engendered by the introduction of a CIS in determining the eventual success of the system.

Finally, this study has also identified that certain key best practice variables can form the basis for effectively managing organisational issues and thereby ensure a positive organisational impact occurs following the implementation of a CIS. Similarly, it was also found that the same best practice variables provide the foundation for the treatment of both user ownership and user attitudes. Consequently, these findings suggest that best practice variables have a dual role in systems development projects. Not only do they have a direct relationship with the perceived level of success associated with the CIS but they are also important facilitators for managing and developing organisational impact, user ownership and positive user attitudes, all of which are perceived to have a positive relationship with system success.

However, in respect of all of these theoretical contributions, it is important that a variety of follow-up studies, using different research methods and a variety of organisational contexts, are conducted to explore the generalisability of these results.

8.4 IMPLICATIONS FOR PRACTITIONERS

In addition to having important implications for information systems research, the findings reported in this thesis have a number of important implications for the practice of systems development. These implications can be considered at three levels: implications for Community Trusts; implications for the NHS; and implications for the wider IS community in general.

The study should be of particular interest to IS professionals in the community sector as it identifies the key elements that comprise best practice with regard to the development and implementation of community information systems. Consequently, the study's findings provide important insights to IS professionals about where they need to concentrate their efforts in order to ensure that their Trust's CIS is successful. The finding that there is a relationship between a system's organisational impact and its level of effectiveness should also be of great interest to IS practitioners in Community Trusts. It demonstrates that organisational change should be explicitly addressed during the development process and provides important insights into those areas that need to be concentrated upon if the information system is to be successful. Furthermore, the finding suggests that the systems development project should be viewed as an explicit catalyst for organisational change rather than simply a method of automating existing practices. The multiple case study findings have shown that those Trusts that have planned organisational change have experienced higher levels of success. However, by contrast, those Trusts that have not planned organisational change have found that the lack of change has had a negative impact on system success. Consequently, it is important that practitioners assess, plan and manage organisational issues during a systems development project to ensure that the resultant organisational impacts of the system are desirable.

The importance associated with user ownership and user attitudes in determining system success should also be of value to Community Trust IS practitioners. It is interesting to note that the most recent NHS Information Strategy 'Information for Health' (Burns, 1998: p101) notes that:

'The impression of failure connected to IM&T projects in the NHS coupled with

> *clinicians' cynicism about distorted management information priorities and fear of new technology presents a potentially major problem for the NHS in developing and implementing information strategies'*

This statement strongly suggests that in the past those responsible for the development and implementation of information systems in the NHS have failed to win the '*hearts and minds*' of the user community, most of whom are clinicians. This perhaps explains why the attainment of positive user attitudes and user ownership is so important to the ultimate success of IM&T projects in Community Trusts and more generally, in the NHS. Consequently, in future projects, those responsible for the acquisition and implementation of information systems should adopt explicit strategies, from the project's outset, to ensure that these two highly important user conditions are achieved.

Furthermore, this research provides some important insights into how user ownership and positive user attitudes might be attained, namely through the adoption of best practice, in particular, securing active user and senior management participation and providing high quality user training and support. The same best practice variables have also been found to be effective methods of managing the organisational impact engendered by a CIS and as a result increase the value of adopting best practice. However, it is likely that the application of such best practice will only bring about these desired user responses if their attainment is an explicit objective of the exercise. Consequently, it is important that IS practitioners are aware of the importance of adopting these key best practice factors because of their multiple roles in the successful development, implementation and operation of a CIS.

If the results of the study are considered in terms of the NHS in general, some of the key findings are still highly applicable. It is suggested that the importance of adopting best practice and ensuring a positive organisational impact also needs to be recognised in other healthcare organisations that are implementing, or considering implementing, information systems. For example, Doherty et al. (1998) have found many similar results in terms of the importance of adopting best practice for the successful implementation of Hospital Information Systems. Similarly, Beynon-Davies (1995) has highlighted that one of the reasons for the failure of the London

Ambulance Services Computer Aided Dispatch project, was a lack of ownership of the system by users.

It is encouraging to see that the current NHS IM&T Strategy supports a number of the key findings of this research, both in terms of best practice and organisational impact, which are explicitly identified as areas to be addressed in future systems development projects. For example, the strategy (Burns, 1998) highlights the importance of active stakeholder involvement in systems development projects, suggests that training strategies need to focus on the long-term development of an information culture and highlights the need to empower clinicians to use information technology to review and improve their clinical working practices. However, despite the positive steps that the NHS IM&T Strategy is making it still remains to be seen whether the lessons it recommends will be translated into far higher levels of success than have been identified in this research. It is clear that if the NHS is going to achieve the goals that have been set in the new strategy it will have to radically improve on its past performance in the use of information and information technology.

Finally, the results of the study should also be of interest to the wider IS community in general. There has been little empirical research into the relationship between organisational impact and system success and the importance of user ownership and user attitudes has not been fully explored in the existing literature. Although the latter two variables may be more important in human resource intensive organisations, the results should still provide a valuable insight into some of the key areas that may influence system success. In addition, the recognition that some best practice variables can play a dual role in systems development projects, directly influencing success, but also managing organisational impact, could give practitioners in the wider IS community a useful insight into new methods they can employ to ensure system success.

8.5 LIMITATIONS AND AVENUES FOR FUTURE RESEARCH

This research has attempted to study the factors that influence the successful development, operation and implementation of an information system in an organisational sector that has had almost no prior research conducted to address these

issues. The research design has employed both qualitative and quantitative research methodologies in a three stage approach involving both case study and survey research methods. Such endeavours are both daring and ambitious in nature and therefore contain some inherent limitations. In appraising the overall findings of this study, it is important to interpret the results in the light of the following limitations.

Firstly, a significant limitation of the case study research is the relatively small number of informants that could be interviewed. This problem was most noticeably manifested during the later, multiple case study stage, as it was only possible at most to interview five informants within each Trust. It was envisaged that by interviewing informants from different areas of the Trust it would be possible to build up a more balanced understanding of staff's experiences with regard to a CIS. However, it is acknowledged that the informants interviewed may not have provided representative views for all staff in their area and as a result the findings are limited in this respect. This problem was reduced to an extent during the exploratory research as it was possible to conduct 13 interviews with staff in a single Trust, however, even this larger number is unlikely to be totally representative of all the staff employed in this Trust. It is suggested that future case study research needs to gauge the views of more staff in each organisation studied in order to build up a more detailed and robust understanding of the complex issues that may, or may not, lead to a successful CIS.

A second limitation of the study is with regard to the survey element of the research design and the use of a single respondent. In this stage of the research the respondents were limited to IM&T managers in Community Trusts. A single organisational respondent was used in this analysis as an informed source of information regarding organisational characteristics, the uptake of best practice, the level of organisational impact and the performance of the CIS. While such practice is typical of IS survey research (Pinsonneault and Kraemer, 1993), it is by no means an ideal method of data collection. Multiple informants and structured methods of triangulation are perhaps the best methods of obtaining the most accurate data regarding organisational properties (Earl, 1993), and these methods have been adopted in the other stages of the research. A possible avenue for future survey research is to target clinical directors of Community Trusts to give a more clinical based viewpoint on the system

as well as the IM&T manager for the more technical characteristics. However, although appealing, such an approach would be likely to limit the amount of useful data that could be collected. Consequently, possible biases associated with self-reporting by IM&T managers must be considered when interpreting the results of the survey research.

Another limitation of the study concerns its focus on healthcare and the UK's National Health Service. The NHS is an extraordinarily large and complex organisation, which is still very labour-intensive. It has very strong traditions, cultures and sub-cultures running throughout and is generally perceived as being slow to change. Consequently, when embarking upon change programmes, such as the introduction of new systems, managing the human resources and the behavioural issues is probably more important than in other contexts. Whilst, therefore, it is likely that attaining a positive organisational impact, user ownership and positive user attitudes are generally important, especially in labour-intensive organisations, they may not be as important as they are within the NHS. Similarly, the use of best practice factors as treatment approaches to develop these elements may also be less appropriate outside the NHS. Consequently, when it comes to the implications of this study for the wider practice of information systems development, any generalisations have to be qualified in this respect. Future research is required to investigate the precise nature and implications of organisational impact, user ownership and user attitudes in sectors outside of healthcare in order to determine the applicability of the findings of this study to other sectors. It would also be interesting to investigate whether best practice variables are also being used as starting points for treating organisational issues in other organisational sectors and why it is not always easy for practitioners to adopt best practice.

8.6 CONCLUDING REMARKS AND RECOMMENDATIONS

As the level of investment in information technology within the NHS continues to rise, research that investigates the key factors that influence the successful development, implementation and operation of such technology will become increasingly important. To date, there have been numerous studies that have addressed various aspects of IS failure, and yet the incidence of failure and poor

performance remains high. However, there have been few studies that have attempted to study the organisational impact engendered by the introduction of a CIS and its influence on system success. This study helps to fill this gap by specifically addressing the role of organisational impact in successful CIS development projects. Furthermore, this study also investigates the role of organisational impact in the context of best practice and in so doing provides a greater understanding of the complex relationships that determine the ultimate level of system success.

In conclusion, this study has provided invaluable input to both theory and methodological practice. It has provided empirically grounded measures of both best practice and organisational impact that can be used as a basis for further research in the community healthcare sector as well as in the NHS in general. It has identified the central role of user ownership and user attitudes in systems development and highlighted the importance of several less well-known best practice variables. It has also demonstrated the value of combining qualitative and quantitative research methodologies and taking into account confounding factors, both of which have lead to the development of valid and robust findings.

The findings have emphasised the importance of adopting high levels of best practice during a systems development project not only to directly influence system success but also to effectively manage other organisational issues and facilitate both user ownership and positive user attitudes. From a practical standpoint, managers and practitioners alike stand to gain from this study. Three best practice variables have been consistently identified as the key elements of best practice for both influencing success and managing organisational issues, user ownership and user attitudes. Consequently, the importance of ensuring high levels of senior management commitment and participation, user involvement and user training cannot be overstated.

However, the findings have also revealed that the adoption of best practice, while necessary, is unlikely to be sufficient to guarantee system success. Practitioners and managers must both consider the potential areas of organisational impact resulting from the introduction of a CIS at the outset of the systems development project. It is

also important that managers and practitioners, embarking on a systems development project, view the process as a catalyst to effect organisational change, rather than simply automating existing practices. To fail to consider the system's organisational impact is to risk a low organisational impact that is likely to undermine the value of adopting best practice and reduce the performance of the system.

This study has, therefore, emphasised that practitioners need to consider and effectively manage the organisational impact engendered by the introduction of an information system, as well as adopting best practice, in order to achieve system success. Failure to do this, is likely to prolong the current poor performance of many IS development projects.

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Appendix 1 - Exploratory Research Interview Schedule

Exploratory Research Interview Schedule

Interview Questions
Introductory Section
What is your role in the Trust? In what ways have you been involved with the CIS? What do you think the system is aiming to achieve? What are you hoping to achieve from the system? What do you think staffs impression is of the CIS? What significant problems do you think the CIS project has encountered since it started?
Best Practice Section
Introduce informant to concept of best practice: What do you think are the most important elements of best practice needed for the successful implementation of a CIS? Do you think these elements have been adopted at CNHT? In what ways do you think adopting these elements of best practice have influenced the implementation of the CIS? Do you think adopting these elements of best practice will influence the ultimate level of success associated with the system?
Organisational Impact
Introduce informant to concept of organisational impact: During discussion ensure informants address: organisational culture working practices empowerment organisational structure organisational processes What areas do you think will experience organisational impact as a result of the implementation of the CIS? Have these impacts occurred at CNHT? Can you give any examples? Do you think there will be any areas of future organisational impact that will occur as a result of the CIS? Do you think these organisational impacts will influence the success of the CIS? Can you give any examples?

Technical Aspects of the CIS
Do you think the palm top has been easy for users to get to grips with?

Do you think the CIS on the PC has been easy for users to get to grips with? Do you think technical problems will reduce the perceived success of the system? Do you think the complexity of the system will cause increased cost in terms of maintenance?
Concluding Questions
Are there any other issues connected with the CIS that you feel are important that we haven't discussed in this interview? Have these issues occurred at CNHT? Can you give any examples? Do you think these issues will influence the success of the CIS? Can you give any examples?

Appendix 2 Questionnaire and Covering Letter

Crispin Coombs
The Business School
Loughborough University
LOUGHBOROUGH
LE11 3TU
Tel: 01509 263171 Et 4615 Fax: 01509 223960
email: C.R.Coombs@lboro.ac.uk

Ensuring a Successful Community Information System

ALL RESPONSES WILL BE TREATED IN THE STRICTEST CONFIDENCE

Definition of a Community Information System (CIS):

An information system designed to support healthcare practitioners, providing information for improving the quality and effectiveness of care and management requirements.

Would you like a copy of the findings? ☐ Yes ☐ No

If YES, please supply your name and address below.

Name……

Position……

Address……

……

……

……

……

……

……

Please return the completed questionnaire in the free post envelope supplied.

Thank you for your help.

(A) BACKGROUND INFORMATION

1. Please indicate the services that are provided by your Trust by ticking all the relevant boxes below.

Community Services ☐ Acute Services ☐ Mental Health Services ☐ Other Services ☐ Please specify: .....

2. Has your Trust purchased, or developed in-house, a Community Information System (CIS)?

Yes ☐ No ☐ **IF NO GO TO QUESTION 5**

3. To what extent has your CIS been implemented?

Not started Implementation ☐ Partially Implemented ☐ Fully Implemented ☐

4. Please give details of the CIS you have developed in-house or purchased below.

Name of System..... Version.....

Supplier.....**GO TO QUESTION 6**

5. Does your Trust intend to purchase or develop in-house a CIS within the next:

6 months? ☐ 12 months? ☐ 18 months? ☐ 24 months? ☐

Do not intend to purchase a system within the next 24 months. ☐

If your Trust does not intend to develop in-house or purchase a CIS within the next 24 months please give brief details of the reason(s) not to do so below and return the questionnaire in the envelope provided.

.....

.....

.....

(B) DRIVERS BEHIND PURCHASING AN INFORMATION SYSTEM

6. This question has two parts.

(i) Firstly, please indicate which of the statements below were, are, or will be, set as **explicit** objectives for the CIS in your Trust by ticking either the 'Yes' or 'No' boxes.

(ii) Secondly, please rank the statements that were, are, or will be, the explicit objectives of your Trust's CIS, (i.e. the statements for which you ticked the 'Yes' box) in the order you perceive them to be most important with 1 being the most important and up to 11 being the least important.

	Yes	No	Rank
Providing a longitudinal electronic record for patients.	☐	☐	☐
Providing the NHS Community Minimum Data Sets.	☐	☐	☐
Fulfilling the information requirements of Health Commissioners and GPs.	☐	☐	☐
Providing data needed for management purposes from data generated by the care delivery process.	☐	☐	☐
Incorporating security systems to protect patient confidentiality.	☐	☐	☐
Enabling staff to monitor clinical activity in order to improve their clinical effectiveness.	☐	☐	☐
Developing a system that is capable of linking to other systems external to the Trust.	☐	☐	☐
Sharing information between different professional groups.	☐	☐	☐
Producing cash releasing cost improvements	☐	☐	☐
Other important objectives please specify:.....	☐	☐	☐
.....	☐	☐	☐

Please Turn Over

(C) IMPLEMENTATION OF THE SYSTEM

7. In respect of your Trust's CIS please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number ranging from 5, strongly agree to 1 strongly disagree. If your Trust has ***not yet begun to implement*** a CIS please indicate the extent to which you ***expect*** to agree or disagree with the statements.

	Strongly Agree				**Strongly Disagree**
The project has active support from top management	5	4	3	2	1
The users were actively encouraged to participate in the specification and of the Trust's requirements in the development of the CIS.	5	4	3	2	1
The CIS was extensively tested by the Trust before it was fully implemented.	5	4	3	2	1
A broad training programme exists, designed to address wider issues, as well as teaching staff how to use the CIS.	5	4	3	2	1
The training programme allowed for variations in the skill of the user population.	5	4	3	2	1
Extensive support and help was available to staff using the CIS during implementation.	5	4	3	2	1
Users' attitudes towards the CIS have been changing positively during the development and implementation of the CIS	5	4	3	2	1
Enough resources have been allocated to the development and implementation of the CIS.	5	4	3	2	1

(D) FUNCTIONALITY OF SYSTEM

8. Approximately how many staff in total are **currently** using the CIS in your Trust?

None ☐ 1-49 ☐ 50-99 ☐ 100-149 ☐ 150-299 ☐ 300-599 ☐ More than 600 ☐

9. Approximately how many staff in total do you expect to be using the system by the end of 1999?

Less than 50 ☐ 50-99 ☐ 100-149 ☐ 150-299 ☐ 300-599 ☐ More than 600 ☐

10. In terms of the statements below, please indicate those aspects that describe the ***current circumstances*** of your Trusts' CIS. If you Trusts has ***not yet purchased or developed*** a CIS, please indicate the statements that best describe the ***intended*** CIS. Please tick all boxes that apply.

Data Entry:	The system uses portable technology to support the practitioner	☐
	In most cases, clerical staff enter data on the CIS	☐
	In most cases, clinical staff enter data on the CIS	☐
	Both clinical and clerical staff enter data on the CIS	☐
	Clinicians' are required to do error correction associated with the data they input to the CIS	☐
Integration:	Information can be shared between different professional groups within the same organisation, using the ***CIS***	☐
	Information can be shared between different professional groups within the same organisation, using a ***different*** system	☐
Timeliness:	The CIS is updated with new data at least once every ***three*** days	☐
	The CIS is updated with new data at least once every ***seven*** days	☐
Outputs from the CIS:	Can produce a care profile* (formerly known as care package) for patients	☐
	The CIS is able to produce the Community Minimum Data Set	☐

* A care profile is defined as an outline description of healthcare to be provided to patients.

Please Turn Over

(D) FUNCTIONALITY OF SYSTEM (Continued)

11. Please indicate below the **clinical** staff groups that are either *current* users, *planned* users, or who are *not planned* as future users of the CIS, in either a hospital or community setting by ticking the appropriate box. Please note that clinical staff who complete forms that are then entered on to the CIS by clerical staff may also be included as users.

SERVICE AREA	*STAFF GROUP*	*Current Users*	*Planned Users*	*Not Planned as Users*
Community Services:	District Nurses	☐	☐	☐
	Health Visitors	☐	☐	☐
	School Age Nurses	☐	☐	☐
	Midwives	☐	☐	☐
Mental Health Services:	Community Psychiatric Nurses	☐	☐	☐
	Learning Disabilities any discipline	☐	☐	☐
	Clinical Psychology	☐	☐	☐
PAMS:	Chiropody	☐	☐	☐
	Dietetics	☐	☐	☐
	Physiotherapy	☐	☐	☐
	Speech & Language Therapy	☐	☐	☐
	Occupational Therapists	☐	☐	☐
	Health Promotion any discipline	☐	☐	☐
Palliative & Terminal Care:	Marie Curie Nurses	☐	☐	☐
	Macmillan Nurses	☐	☐	☐
Other:	General Practitioners	☐	☐	☐
Others please specify:	.....	☐	☐	☐
	.....	☐	☐	☐

(E) THE SYSTEMS' IMPACT ON THE ORGANISATION

12. Please indicate the extent to which you agree or disagree with the following statements, by circling the appropriate number ranging from 5, strongly agree to 1, strongly disagree. If your Trust has ***not yet begun to implement*** a CIS please indicate the extent to which you expect to agree or disagree with the statements.

	Strongly Agree				**Strongly Disagree**
The CIS evoked large changes in users' clinical working practices in our Trust.	5	4	3	2	1
The CIS evoked large changes in users' non-clinical working practices in our Trust.	5	4	3	2	1
The CIS has **not** improved the existing flow of information in our Trust.	5	4	3	2	1
The CIS has empowered users by giving greater accessibility to information in our Trust.	5	4	3	2	1
The CIS has had a big impact on the culture of the user groups, where organisational culture is defined as *'The set of assumptions, beliefs and values, often unstated, that members of an organisation share in common.'*	5	4	3	2	1
The Trust is having to make large changes in its organisational processes to fit with the CIS.	5	4	3	2	1
The CIS has caused large changes in the organisational structure of the Trust.	5	4	3	2	1
The users are accepting ownership of the CIS	5	4	3	2	1
Clinical staff still keep paper based records to the same extent that they did prior to the CIS.	5	4	3	2	1

Please Turn Over

(F) PERFORMANCE OF THE SYSTEM

13.. Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number ranging from 5, strongly agree to 1, strongly disagree. Each statement is only concerned with the ***present circumstances*** of your Trust's CIS, rather than future expectations. If you have ***not yet started to implement*** your CIS please disregard this section.

	Strongly Agree				**Strongly Disagree**
The CIS is considered to be a technological success in terms of accuracy and reliability.	5	4	3	2	1
The reports produced by the CIS have been relevant, informative and useful to professional clinical staff.	5	4	3	2	1
The reports produced by the CIS have been valuable aids to decision making for managers.	5	4	3	2	1
Professional staff use the CIS regularly to retrieve information, rather than purely inputting data.	5	4	3	2	1
Staff like using the CIS.	5	4	3	2	1
Staff are satisfied with the CIS.	5	4	3	2	1
The new information provided by the CIS has led to changes in decisions, or new decisions by staff.	5	4	3	2	1
The CIS has enabled practitioners to spend more time providing direct patient care.	5	4	3	2	1
The CIS has improved users overall job performance.	5	4	3	2	1
The CIS has allowed clinical staff to be used more efficiently in direct patient care.	5	4	3	2	1

(G) OTHER COMMENTS

If you have any other comments on any aspect of Community Information Systems, for example specific comments on training styles, attitudes of certain professional groups etc, please write them in the box below. Please continue on the other side of this sheet if you need more space.

Please return the questionnaire in the envelope provided.
Thank you for your help.

Appendix 3 Interview Schedule and Questionnaire

Ensuring a Successful Community Information System:
Interview Schedule

Interviewee:.....
Position:.....
Trust.....
Date:.....
Interview Start:.....
Interview Finish:.....

1. Purpose of Interview:

NB: This interview is completely confidential. I shall be transcribing the tapes and you will not be identified in the reports produced.

This interview is intended to try and understand from your perspective how your CIS was implemented and the problems and treatment approaches you encountered. It is intended that by interviewing a few other people at your trust a balanced picture can be built up from different viewpoints.

I'm going to cover two main areas, the first section being concerned with how your CIS was implemented and the second concentrates on the organisational impact the system had on your trust.

The structure of this interview is not based on any particular order of importance. So essentially, the interview will cover issues that I believe are important to CIS projects but it is for you to indicate through your answers whether you agree with me.

From the results of these interviews I am hoping to develop a series of recommendations to improve the 'best practice' of implementing CIS. A consultative report based on these interviews at your trust will be made available to you in due course.

2. It would greatly help if the interview could be taped - would this be acceptable?
Yes/No

Introductory Questions

Approximately when was the decision taken to purchase a CIS?

Approximately when was the system delivered?

When did you start implementing the system?

How far are you towards total implementation?

When was the implementation completed?

What was your role in the development and implementation of the CIS?

Best Practice

Senior Management Commitment

Do you think there has been senior management commitment for the CIS project?

What form has this senior management commitment taken? i.e. active participation? resources, positive attitudes, employment of extra staff etc.

Has the level of senior management commitment varied at all during the project? Why has there been variation and in what ways?

Have there been any changes in senior management personnel during the project? What effects have these changes had?

So, in terms of implementing the CIS, where do you think senior management commitment has had a positive impact?
examples?

User Involvement

Who would you say are the main front line users of the CIS?

At what stages have users been involved in the project?

What form has the user involvement taken?

Can you give me any examples of user involvement having influenced decisions regarding the project?

So, what would you say are the main areas, in terms of implementing the system, that have benefited from user involvement?
Testing of the System

In what ways was the system tested before the main roll-out?

Was a pilot of the system done?

Where any lessons learnt from the testing/pilot that influenced how the eventual roll-out of the system was conducted?

User Training and Education

Was training in how to use the system provided for staff?

Was any training provided by the supplier?
What form did the supplier training take?

Could you briefly describe how the training for the system was organised, covering areas such as, the number of sessions provided, how long the sessions were, whether they involved groups or one-to one contact etc.?

Did the training educate staff about the system, for example, preparing staff for changes in their working practices, changes in their organisational culture?

Was the training linked to real life aspects of staff using the system or were they taught to use the CIS in isolation from real job scenarios?

Did the training try and inform staff about the role of the CIS in the trust as a whole as well as covering the operation of the system?

Approximately what percentage of the training would you say was spent on this 'wider picture' element?

What obstacles were encountered in managing and delivering the training during the project and how were they resolved?

Were staff satisfied with the training?
How was this satisfaction measured?

Do you think the education and training provided has influenced any other areas concerned with the implementation of the system?

Support and Help for Staff

Was support provided for staff during the implementation?

So again, could you briefly describe how the support for staff using the system was organised and what were the main elements of support provided?

e.g. an IT help desk, Clinical advisors, Visits from IT staff, Support/advice on support provided by supplier?

What obstacles were encountered in providing support and help to staff during the implementation and how were they resolved?

Were staff satisfied with the levels and style of support and help available?
What indicators are there to support this impression?

User Attitudes

Do you think users have become more positive towards the system during the implementation?

If no, have you tried to develop positive user attitudes?

If no, why do you think users don't have positive attitudes towards the system?

How have you (tried) to develop positive user attitudes during the implementation of the CIS?

What evidence is there of positive user reactions to the system?

Do you think user reactions have been significantly influenced by any other issues during the CIS project?

User Ownership

Have there been efforts to try and achieve a sense of user ownership associated with the system?

What methods were used to try and achieve user ownership?

What problems were encountered in trying to achieve user ownership and how were they resolved?

In what ways do you think achieving user ownership will influence how the trust operates?
For example, changing working practices or changes in organisational culture.
Can you give any examples?
If user ownership not achieved, do you think it would have any effect?

Empowerment of Users

In terms of empowerment, what changes have there been for users since they have been using the system?

Were these changes explicitly planned prior to implementation or have they been more ad hoc?

In trying to empower users what problems have been encountered and how have they been resolved?

Has the level of user empowerment effected any other issues associated with the CIS?

Organisational Culture

In what ways do you think the organisational culture of your trust has changed since the staff started using the system?

Were changes in organisational culture planned in an explicit pro-active way prior to implementation or were the changes as a result of staff using the system?

How were these changes in organisational culture managed?

What methods were adopted to ensure that these changes in organisational culture had a positive effect on the system?

Have changes in organisational culture effected any other issues associated with the CIS?

Changes in the Flow of Information

In what ways has the flow of information within the trust changed as a result of the system going live?
What effects have these changes had on the operations of the trust?

Were these changes in the flow of information planned in an explicit pro-active way prior to implementation or did changes occur on a more ad hoc basis?

What obstacles were encountered to changes in the flow of information within the trust and how were they treated?

Has changes in the flow of information influenced any other issues in the trust such as changes in the distribution of power or changing working practices?

Changes in non-clinical working practices

Do you think the non-clinical working practices of staff using the system changed since they started using the system?

Were changes in non-clinical working practices planned in an explicit pro-active way prior to implementation or were the changes as a result of implementing the system?

How were these changes in non-clinical working practices managed?

What problems were encountered as a result of changing working practices and how were they treated?

Do you think these changes in non-clinical working practices have influenced any other issues associated with the CIS?

Changes in clinical working practices

Do you think the clinical working practices of staff using the system have changed since the system was implemented?

Were these changes in clinical working practices planned in an explicit pro-active way prior to implementation or were the changes as a result of implementing the system?

How were these changes in clinical working practices managed?

What problems were encountered as a result of changing clinical working practices and how were they treated?

Do you think these changes in clinical working practices have influenced any other issues associated with the CIS?

Changes in Organisational Processes

So, if we now look at the organisational changes at a more macro level, do you think organisational processes have changed as a result of the implementation of the CIS?

Were changes in organisational processes planned in an explicit pro-active way prior to implementation or were the changes as a result of staff using the system?

How were these changes managed during the implementation of the CIS?

What problems were encountered in the management of the changes in organisational processes and how were they treated successfully?

Have changes in organisational processes had any effect on other issues such as empowerment, user ownership or changing working practices?

Changes in Organisational Structure

Similarly, thinking again at the macro level, do you think the organisational structure of your trust has changed since the CIS has gone live?
Were these changes planned in an explicit pro-active way prior to implementation or were the changes as a result of staff using the system?

How were changes in organisational structure managed following the implementation

of the CIS?

What problems were encountered as a result of these structural changes?
How were these problems resolved?

Have changes in organisational structure had any effect on other issues such as empowerment, user ownership or changing working practices?

Non-Directed Section

Do you think there are any other determinants of CIS success that have not been covered in this interview?

Are there any other areas that you feel are particularly important in the implementation of a CIS that we have not already covered?

Are there any other areas associated with the organisational impact of a CIS that you feel are important that we haven't covered?

Would it be all right to contact you again by phone, if I need to follow up any additional questions? They are likely to be things like issues that emerge later on through the interviews or things that I need to clarify when analysing the interviews.

In due course I shall be sending out a report based on the interviews I have conducted at your trust so I shall send a copy to you when it is ready.

Thank you very much for your time, it is much appreciated.

Performance Measures

Name:..... Name of Trust:.....

Please indicate the extent that you agree or disagree with the following statements, by ticking the appropriate box.

	Very Successful		Neutral		Very Unsuccessful
1. To what extent do you think your CIS has been successful in terms of its technical capabilities and functionality?	☐	☐	☐	☐	☐

	Very High Quality		Neutral		Very Low Quality
2. How would you rate the quality of the reports produced from your CIS, in terms of accuracy, timeliness and relevance?	☐	☐	☐	☐	☐

	Staff make very high use of the CIS		Neutral		Staff very rarely use the CIS
3. To what extent have managers made use of the CIS to get information that is useful for their work activities?	☐	☐	☐	☐	☐
4. To what extent have users made use of the CIS to get information that is useful for their work activities?	☐	☐	☐	☐	☐

	Needs are met extremely well		Neutral		Needs are met very poorly
5. How well do you think management information needs are being satisfied by the system?	☐	☐	☐	☐	☐
6. How well do you think user information needs are being satisfied by the system?	☐	☐	☐	☐	☐

	Staff like the CIS a lot		Neutral		Staff dislike the CIS a lot
7. To what extent do you think management like the system?	☐	☐	☐	☐	☐
8. To what extent do you think users like the system?	☐	☐	☐	☐	☐

	The CIS has had a very big effect		Neutral		The CIS had had very little effect
9. To what extent do you think that the information provided by the CIS has improved the performance of the trust?	☐	☐	☐	☐	☐

	The CIS has had a very big effect		Neutral		The CIS had had very little effect
10. To what extent do you think the functional output of your trust has improved since the introduction of the CIS? e.g. reducing costs, increasing productivity.	☐	☐	☐	☐	☐

Appendix 4 Examples of a Time Ordered Display, a Conceptually Ordered Display and an Effects Matrix

Time based variation of best practice and organisational impact factors at Trust C

	DEVELOPMENT				IMPLEMENTATION AND ORGANISATIONAL IMPACT				Researcher Comments
	1995	Jan 1996	Feb - Dec 1996	Jan 1997	Feb 1997	Mar - Dec 1997	Jan - Jul 1998	Aug 1998	
EVENTS	Decision to purchase CIS. CIS Delivered	Pilot start Change in Project Manager		Pilot end. Evaluation of pilot conducted Change in Project Manager	Roll out started			Roll out 2/3's completed Appointment of clinical development advisor	
SMC		Stable (SCM, CU p2)			Risen and		strengthened (M p1)		Overall SMC has risen during the project
User Invol	Specification of requirements (IT p2, M p2) Purchase Decision (IT p2)	Pilot User Group			User Groups		- Project Advisory Team (M p2), - NAG (SCM p6, CM p3, CU p4), - CIS link meetings (SCM p7,CMp3 CU p6) CIS Newsletter - (M p3, CU p6)		UI has increased since the pilot and there has been increased efforts to develop the CIS clinically using UI
Testing	Test Database (IT p3)	Pilot Testing on Two Teams (SCM, CM		p4)	Test new versions		of CIS in IT Dept (IT p3)		IT Dept now test all new versions of CIS because of history of technical problems with new software, testing has continued rather than tailing off as would be expected
Training & Education	Training provided to IT staff from Supplier (IT p4, SCM p8,)	Basic training provided by CNHT clinicians involved in the pilot.		trainers to	Introduction of 'Concepts' Training (IT p4)		Follow up training introduced (IT p6)		Discovered the importance of concepts training after pilot to support the change in the delivery of care prompted by the adoption of packages of care.
User Support	N/A	Help line (IT p6, M p6, SCM p7, CM Manuals (SCM p10)		p8)	Help line (IT p6, Introduction of 3 Clinical Advisors for Manuals (SCM p10		M p6, SCM p7, CM p8, CU p10) Clinicians (IT p6, SCM p7, CM p9) CU p5)		Found users were expecting IT help desk to answer clinical questions that they were not best placed to answer and consequently the clinical advisors were introduced for the roll out
User Attitudes	High user expectations (SCM, p13)			Users were becoming discouraged (Pilot Eval p3)	User Attitudes have improved (IT,		p7, M p6, SCM p13, CM p9, CU p11)		Since the pilot was completed and as the roll out has progressed, so user attitudes are gradually improving.
Empower	Empowerment						Starting to see examples of		Empowerment is a more long term change that is

	DEVELOPMENT				IMPLEMENTATION AND ORGANISATIONAL IMPACT			Researcher Comments
	was planned (IT p8, M p7, SCM p2, CM p10)						empowerment (IT p8, SCM p2, CM p10)	likely to be more evident when the system is fully rolled out and fully functional (M p7)
User Ownership							Attempting to generate User Ownership (IT p9, CU p13) Had some success with Team Leaders but little with users (SCM p3)	User ownership has only really been addressed over the last 6 months (IT p9) and little progress has been made so far. Assume not had any user ownership prior to Jan 1998.
Culture	Expected changes but did not know in what ways (IT p10, M p10 SCM p4) Appointed OD Advisor (IT p10, CM p12)					Developing Staff have	Information Culture (IT p9, Mp9, CM p6) become more IT aware (IT p9, SCM p4, CU p15)	Starting to develop an information culture but again this is likely to develop faster once the CIS has been fully rolled out. Signs that clinicians are starting to think about using information more in their day to day activities.
Flow of Information	Changes in Flow of Information planned (IT p10, M p11, SCM p6, CM)						Manual data collection has been reduced as has paperwork (IT p10, M p11)	Staff are now entering data electronically and no longer having to duplicate that information on paper as there is confidence in the data quality. Consequently Daily Diary Sheets have been removed for staff to complete in several Teams.
NCWP	Changes in NCWP not planned (IT p11, SCM p7, CM p13)						Reduced manual data collection and paperwork (IT p11, M p12, CU p2) Downloading and uploading (CM p13) Altered patient contact situation (SCM p1)	Only minor changes in non-clinical working practices so far.
CWP	Changes in CWP planned - introduction of packages of care (IT p12)						Change in the concepts behind the delivery of care by introducing packages of care and attempting to inform clinical practice (IT p12, M p13, SCM p7, CU p18)	CNHT took decision to introduce packages of care as a care approach that is supported by the CIS. Consequently this has caused clinical working practices to start to change. Like NCWP these changes are still in their infancy.
Structure		Change in Project Manager - facilitated greater involvement from		Change in Project Manager (M			Appointment of clinical development advisor (CU p20)	There have been two changes in the project manager over the duration of the project. The first change allowed an increased involvement of other staff,

	DEVELOPMENT				IMPLEMENTATION AND ORGANISATIONAL IMPACT			Researcher Comments
		other staff(M p15)		p15, CU p3)				both management and users. The latest change resulted in the OD Advisor taking over the Project Manager role.
Processes							Used data to support contracting (CU p19)	No changes in organisational processes to date. Believe that the system has to be fully implemented before changes will be seen. Once this has occurred improvements in contracting and resource allocation are envisaged (IT p12, M p15 CM, p14)

Thematic Conceptual Matrix for Trust C

FACTOR	MANIFESTATION OF FACTOR	FACILITATOR	INHIBITOR	SOLUTION
SMC	Positive message about CIS (IT p1, M p2, SCU p5, CM p1, CU p3) Good structure for project (IT p1) CIS identified as priority (IT p1) Lack of support from Nursing Directorate (IT p1) Financial resources (M p1, SCU p6, CM p1, CU p2) Active involvement from SM (M p1, SCU p5) Good communication between SM and Staff (CU p2)	Change of Key Management Personnel (IT p2, M p2, CM p2) Change of First Project Manager (IT p2, SCU p6)	1.Change of Project Manager (IT p1, CU p3) 2.Big Brother Fear (CU p2)	2. Returning information and reducing paperwork (CU p2)
User Invo	Specification of requirements (IT p2, CM p3) Raising awareness of system (IT p2) Purchase decision (IT p2) User Groups (M p2, SCU p6, CM p3, CU p6)		1. Lack of Interest from staff (CU p4)	1. Greater access to information (CU p4)
Testing	In-house testing (IT p3 CM p4) Pilot (IT SCU CM p4) Test Database (IT p3)			
Training	Supplier Training to IT staff (cascade) (IT p4, M p4, SCU p8) Training provided for CNHT staff (IT, M, SCU p9, CM, p5) Initial practice on dummy CIS (CM p5, CU p7) Training linked to real life (CU p7)	On-site Training (CM p7)	1.Need for clinical element in training (IT p5, M p4) 2.Duplication of work (p5) 3.Variation in user skill levels (IT p5, CM p8) 4.Time management (SCU p10, CM p7, CU p7) 5.Illness of staff or trainer(SCU p10) 6.Training didn't link to existing working practices (CU p6) 7.Fear of Big Brother (CU p6) 8.Fear of technology (CU p6)	1.Introduced wider issues training (M p4) 1.One of the trainers was an ex-clinician (CU p7) 2.Focus on benefits (IT p5) 3.Additional training (IT p4) 4.Additional Bank staff (CM p7, CU p8) Additional financial resources (CU p8)
Education	Wider Issues Training (IT p4 SCU p9, CM p7)		1.Lack of interest from users (IT p5, SCU p10, CM p7) 2.Need to actually use CIS (SCU)	1.Follow up training sessions (CM p7)
User Support	Help line (IT p6, M p6, SCU p7, CM p8, CU p10) Clinical Advisors (IT p6, SCU p7, CM p9) Manuals (SCU p10, CU p5) Extra Resources (CM p8) (NB link to SMC)		1.Clinical Advisors not available (IT p6) 2.Human Resources (IT p6) 3.Staff not using manuals (M p6, SCU p10, CM p9, CU p10) 4.Clinical Advisors having own work still to do (SCU p12)	1.Develop Systems Champions (IT p6)
User Attitudes	Users demanding more information (CU p11)	User Involvement (IT p7) Training (IT p7) Positive message from SM (IT p7, M p6 Managing user expectations (SCU p13) Emphasising good practice (SCU p14) Collecting relevant information (SCU p15)	CIS not functioning (M p6) User Expectations not realised (SCU p13) Fear of Change (CM p9) Fear of Technology (CM p9) Fear of Big Brother (CU p11)	

FACTOR	MANIFESTATION OF FACTOR	FACILITATOR	INHIBITOR	SOLUTION
		Change in Organisational Culture (CM p10) User Support (CU p12) User Involvement in feedback sessions (CU p12)		
Empower	Greater access to information (IT p8) Greater demand for information (SCU p2) Less paperwork (p10)	Full Implementation of CIS (M p7 User Involvement (SCU p3	Duplication of Data Collection (IT p8, CM p10 CIS not user friendly (IT p8 Initially data collection time consuming (IT p8 Fear of technology (SCU p2, CM p11) Fear of Big Brother (SCU p2) Need to increase return of information (CU p12)	
User Ownership	Attempting to achieve user ownership (IT p9, M p8, SCU p3, CM p11, CU p13)	Full Implementation of CIS (M p9) Showing how CIS can support existing working practices (SCU p4) User Training (CM p11) Positive message that users own system from SM (CU p13) Support staff are very positive (CU p14)	1.System initially perceived as IT owned (IT p9 2.Human Resources (IT p9) 3.Difficult to get middle management commitment (M p8 SCU p4) 4. Low return of information to users (CM p11) 5. Big Brother fear (CU p13) 6. Need national re-education of staff (CU p14)	2.Appointment Clinical Development Advisor (IT p9) 3.Selling capabilities to middle management (M p9)
Culture	Staff are more IT aware (IT p9, SCU p5, CU p15) Challenging current working practices (IT p9) Developing information culture (M p9, CM p6) More open culture (CM p10) – Linked to positive UA	User Involvement (IT p10, CM p12) User Training (IT p10) User Support (IT p10) Positive message about CIS (IT p10) Focusing on benefits of CIS to staff (IT p10) Appointment of OD Advisor (CM p12)	1. Staff fear of technology (CU p15)	1. Help desk reassurance (CU p15)
Flow of Information	Information available electronically (IT p10, M p11) Simplify information flow (SCU p5) Improved information flow (IT p10, CM p12)		Duplication of Data Collection (IT p10) Lack of Interest from Staff (M p11) Technical Problems with CIS (M p11) Time to develop relevant data collection (SCU p6) CIS not fully implemented (CM p12)	
NCWP	Reduced paperwork (IT p11, M p12 ,CU p16) Changed patient contact situation (SCU p1) Need to upload and download (CM p13) Using PC more (CU p17)		1.Human Resources (IT p11) 2.Fear of Big Brother (SCU p7) 3.Number of download points (CM p13) 4. Need for additional training (CU p18)	2.Training (allaying fears) (SCU p7)
CWP	Change in concepts behind delivery of care (IT p12, M p13, SCU p7, CU p18)	Communication (IT p12) Wider Issues Training (IT p12) Appointment of Clinical Development Advisor (M p13) Empowerment of staff (M p13) User Involvement (SCU p8) Raising awareness of users (SCU p1) Follow up training (SCU p1)	Human Resources (Clerical support) (IT p12) Technical Problems with CIS (IT p12) Lack of interest from users (SCU p1) CIS not fully implemented (CM p14, CU p18) CIS not yet producing evidence to change CWP (CU p18)	
Structure	Changes in key management personnel (M p15,			

FACTOR	MANIFESTATION OF FACTOR	FACILITATOR	INHIBITOR	SOLUTION
	CU p3) Appointment of clinical development advisor (CU p20)			
Processes	Used CIS to support contracting (CU p19)		Poor Data Quality (CU p19)	

Effects Matrix: Direct and Side Effects of all Factors for Trust C

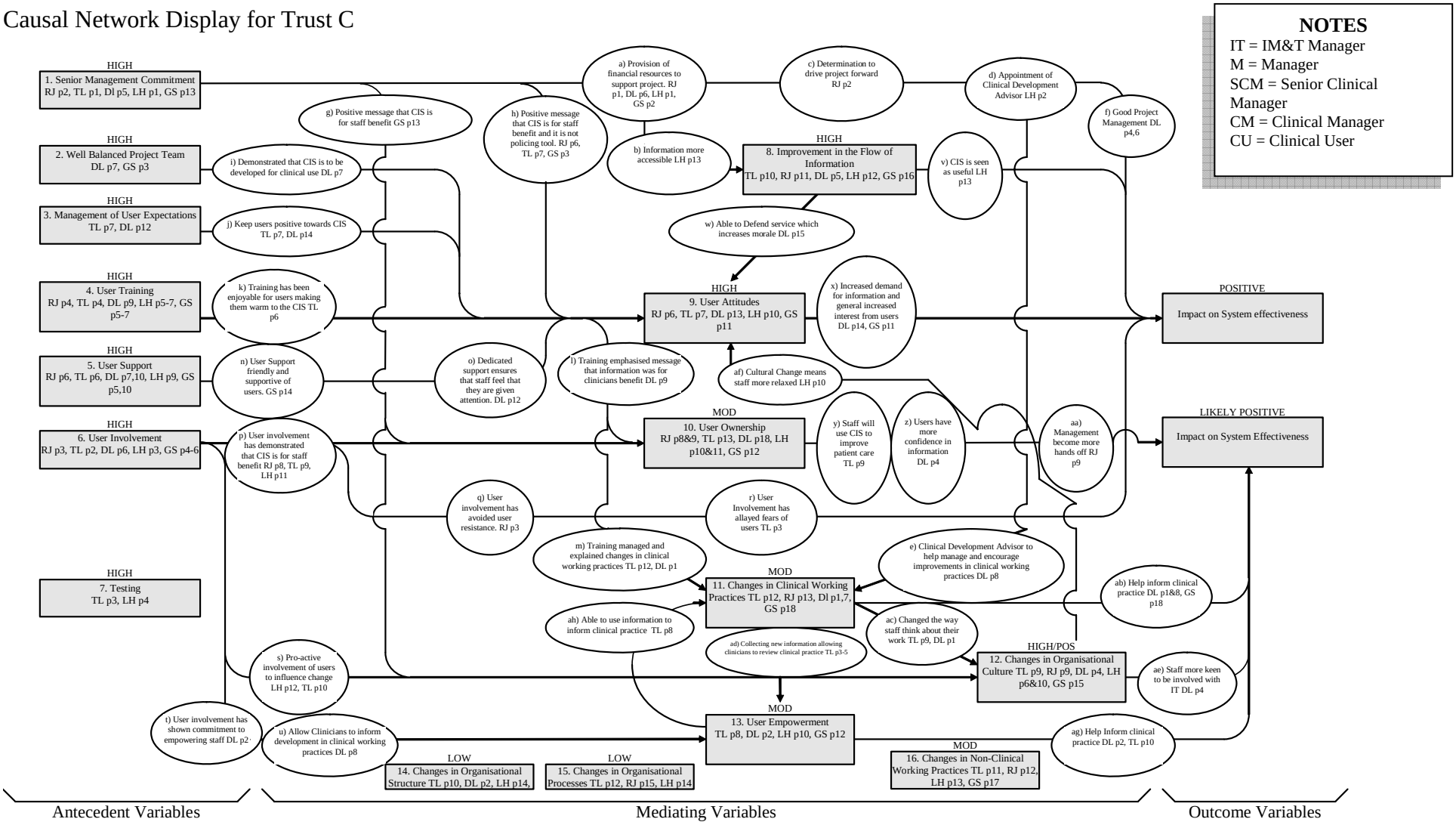
Factor	DIRECT EFFECTS +	 -	SIDE EFFECTS +	 -
SMC	Positive message to staff (IT p1) Good Project Management (SCM p6) Appointment of Clinical Development Advisor (CM p2, CU p3)		Potential dissenters knew they were up against Trust not simply project manager (IT p1) Encouraging User Ownership (M p2) Provision for additional training time (CM p2)	
User Invol	Specification of requirements (IT p2, M p2 Purchase Decision (IT p2 Raising awareness of CIS (IT p2 Changed how system was rolled out –team based (IT p2, Influenced Coding Structure (IT p2, SCM p7 Allayed Fears (IT p3, SCM p8) Developing the system (CU p5)		Influenced style of training – intro wider issues training (IT p2, M p3, CM p4) Influenced style of training – not team based (CM p4) Additional clerical Support (M p3 More positive attitudes towards CIS * (M p3) Appointment of Clinical Development Advisor (SCM p7, CM p4) Improved communication with users (SCM p8) Encouraged User Ownership*	
Testing	Lessons from Pilot – roll out was team based (IT p3) Lessons from Pilot – Introduction of wider issues training (IT p4, SCM p7, CM p5) Lessons from Pilot – Need for ongoing support (SCM p8) Lessons from Pilot – Need for user groups (SCM p7) Lessons from Pilot – Need for additional Clerical support for users (CM p5)			
Training	Overall Staff were satisfied with the training – based on evaluation (IT p4, M p4, SCM p11, CM p7, CU p8) Allayed Fears (IT p6) Encouraged positive user attitudes (IT p6)			
Education		Didn't prepare staff for changes in their clinical working practices (SCM p9)		
User Support	Users Satisfied with Support – based on evaluation (IT p7, M p5, SCM p12, CM p9)		On going support maintained momentum for the project (SCM p12)	
User attitudes	User attitudes positive – evidence from evaluation (IT p7, CU p12) Greater demand for information (SCM p14 CM p10, CU p11) Improve skill mix (CU p11)			
Change in Empowerment	Cultural Change (IT p8) Greater demand for information (SCM p2) Empowerment likely in future (CU p12) Challenging use of information (CU p13)			
User ownership	Will allow CIS to inform on clinical practice (IT p9) Will mean that management can be more 'hands off' (M p9)			

Factor	DIRECT EFFECTS +	-	SIDE EFFECTS +	-
	Will improve data quality (SCM p4) Will encourage empowerment (CM p11)			
Changes in Culture	Staff have become more IT Aware (IT p9, SCM p4) Challenging current clinical working practices (IT p9) Change in management style of Nursing Directorate (M p10) User attitudes are becoming more positive (CM p10) Developing information culture (M p9, CM p6)		Users looking for more opportunities where technology can benefit their work activities (SCM p4) Nursing Directorate paying more attention to user needs wrt CIS (M p10) More pro-active involvement of users (CM p12)	
Changes in Information Flow	Show management actual workload (IT p11, SCM p15) Information is more accessible (CM p13, CU p16)	Redistribution of power (IT p10)		
NCWP	Reduced paperwork (IT p11) Reduced manual reporting (M p12)			Big Brother suspicion around data collection (SCM p7)
CWP	Effects in the future for audit, accounting, contracting, informing clinical practice (CM p14)			
Structure change	Developing an information culture (SCM p2) Changes in personnel to make implementation more effective (M p16)			
Change in Processes	Will improve information for contracting and resource allocation (M p15, CM p14)		Greater empowerment of staff in the future (SCM p2)	

* Inference made by researcher

Appendix 5 Example of a Causal Network Display with Supporting Quotes

Causal Network Display for Trust C



CNHT NHS Trust (Trust C) Within Case Analysis

RATING	Variables	Explanations
HIGH	1. Senior Management Commitment and Active Participation '**Do you think there has been senior management commitment for the CIS project?** Yes I do. **What form has this commitment taken?** Its most obvious form is the amount of resources they have put into it, I think, following the support of the senior management team and the Board and the amount of money that has been devoted to it. **So would you say there has been active participation?** There have been three Directors of the Trust who have been actively involved at various times. Which I think is a demonstration as well, I mean they have not all had the same view of what should be happening at the same time, but they have all been enthusiastic about it.' (RJ p1) **'Do you think there has been senior management commitment for the CIS project?** Yes. I think that commitment was shown in the fact that I think we have the right structure for that in terms of PRINCE, in that we have an IT steering group which is basically the strategic direction of IT in the Trust to ensure that it maps to the business planning cycle. Of those members there is the chairman of the project board who has been very supportive who is a Trust Board member and we have at least two other people on the project board who are board members.' (TL p1) 'Do you think there has been senior management commitment for the CIS project? Yes, I do. What form has this senior management commitment taken? I think there are certain senior managers that have taken an active view.' (DL p5) 'Do you think there has been senior management commitment for the CIS project? Yes. What form has this senior management commitment taken? Well there has been financial, I believe, because obviously this is a very big commitment.' (LH p1) '**Do you think there has been senior management commitment for the CIS project?** Yes there has been the backing there. I think there has been the backing there and sort of locality management wise we have been very well supported there. I think we have been very well supported by senior management' (GS p1, 3)	a) Provision of financial resources to support project '**Where do you think senior management commitment has had the biggest positive impact on the CIS project?** I think in terms of the resource element in that extra funding and resources have been identified to help with a smoother transition in terms of the implementation so in terms of clerical support for example.' (DL p6) **What form has this senior management commitment taken?** Well there has been financial, I believe, because obviously this is a very big commitment.' (LH p1) **What form has this commitment taken?** Its most obvious form is the amount of resources they have put into it, I think, following the support of the senior management team and the Board and the amount of money that has been devoted to it. (RJ p1) 'Most teams have managed to get somebody in the team who is sort of really keen on the system and the management have actually turned to Finance to ensure that they are paid extra to make sure that the system is clear and there is no backlog of things. That has worked very well.' (GS p2) b) Information More accessible 'That is beginning at one end but again being able to use your PC and look at things - I'm still in my infancy of doing that but it is absolutely wonderful. If a complaint comes in I can actually see and know who has last been in there. It just saves so much time, so much faffing about.'(LH p13). c) Determination to drive the project forward 'Where do you think senior management commitment has had the biggest positive impact? A determination that it should actually happen really.' (RJ p2) d) Appointment of Clinical Development Advisor 'I had a very steep learning curve there and whilst I do not profess to know all the IM&T stuff, I don't need to, but that made me see that we needed a professional development person and that support from the senior managers has come forth with a full time development post, and that demonstrates commitment.' (LH p2) e) Clinical Development Advisor to help manage and encourage improvements in clinical working practices 'That is why we have the development worker in place, to look at those issues and encourage the users to develop and improve their clinical practices' (DL p8). f) Good Project Management 'They've [senior management] kept a clear view in terms of overall project management and have been quite clear about how it is to be implemented , by which group and that timetable has been kept. I think project management is the key. I think you have to have dedicated resource to the project manager and to have clear roles for the people identified. So clear overall co-ordination by a project manager and then identified roles and responsibilities within the project' (DL p4, 6) g) Positive message that CIS is for staff benefit 'I think all Managers say, "Its your system" I think right from the outset, we have tried to reinforce that its their system and what they put in it is for their use.'(GS p13)

RATING	Variables	Explanations
		h) Positive Message that CIS is for staff benefit and it is not a policing tool '**So how have you tried to develop positive user attitudes towards the system?** By sending messages out that the system is a friend, that it is not a management system, its not a way of checking up on you and by appointing the Clinical Development Advisor to get involved with the project which is designed to enable the user to see the system as a friend.' (RJ p6) '**Where do you think senior management commitment has had the biggest positive impact?** I think its the basics. I think it is more down to the fact that they are reinforcing the message that the more the system is used the less paperwork will be used in the future. That's the biggy, because at the moment it is just a big paper chase for everything that we do and I think the fact that senior management say that eventually this will go, I think that is the biggest message they are putting across to everybody.' (GS p3) 'I think user reactions are influenced by the message from the top. If for example the head of the nursing directorate had given out any negative vibes I think the people that were slightly disgruntled in the first place because of the changes that were happening to them might have latched onto that and said "well in that case, we're not doing it."' (TL p7).
HIGH	2. Well Balanced Project Team **'**With staff saying this isn't informing my clinical practice which led us to get a Clinical Development Advisor in place and say we don't just want this as a managerial system, we actually want it to inform clinical practice.' (DL p7) 'The fact that we have now got the Clinical Development Advisor in place, sort of helping to develop the system as well. Which from a clinicians point of view is excellent as it saves us a lot of work.' (GS p3)	i) Demonstrated that CIS is to be developed for clinical use 'I think it has helped us to show that we are serious about developing the system for clinicians and I think that has been a boost for them.' (DL p7)
HIGH	3. Management of User Expectations '**How have you managed user expectations during the CIS project?** I think in the involvement at the outset in explaining why we are doing this, what we were trying to achieve, I think that was clear. I think the concepts training takes that a stage further in terms of what we are trying to achieve. I think we have spent a lot of time listening to people in terms of what there reporting requirements are.' (TL p7) 'In terms of managing user expectations its been, we've learnt a lot from the pilot staff about not telling them too much about the potential but discussing about actual and what was realistic. So I think there has been a big swing towards the deliverable. Also the work the quality assurance team did in terms of actually mapping potential benefits in terms of whether it was a high medium or low need for clinicians in the Trust. Whether it was realistic for us to deliver those and realise them. But a lot of that hasn't been shared with clinicians because we need to understand it ourselves before we go out and give the message. In terms of managing it was difficult at the beginning but I think we have learnt through lowering user expectations and concentrating on what we can provide.' (DL p14)	j) Keep users positive towards CIS 'I think it has helped to keep the user positive and kept them on our side.' (TL p7) 'I think managing user expectations has helped keep the users on board and I think making sure that we deliver to their expectations is important.' (DL p14)
RATING	Variables	Explanations
HIGH	4. User Training 'My own impression is that the training has gone very well. I am not aware of there being any problems with the training and as far as I am aware staff were satisfied with the training.' (RJ p4) 'There are two aspects to the training. There is a clinical aspect which is around concepts and there is the	k) Training has been enjoyable for users making them warm to the system 'I think that the training that they are getting has definitely had a favourable response from the users and I think that largely has been an enjoyable experience for them because of the characters that we have got in there so I think that the training and

RATING	Variables	Explanations
	operational use of the system which is carried out by IT people. I think largely people have been happy with the training.' (TL p4) 'We very much took a team based approach and again it was structured in that they had concepts training prior to formal training so concepts training was half of it and then they're introduced to the palmtop in terms of, this is the palmtop, hold it, you can open it up and then followed up with specific training on the palmtop later. What sort of time scale was this? I think its a half day session for the concepts and the introduction and they have more or less another full day after that. **Have staff been satisfied with the training?** I think generally there have been high levels of satisfaction i.e. that they've not found it too patronising and that its been at the right level.' (DL p9) 'They had three half days of training, a half day's concept training which was professionally talking about the Care Objectives and the Care Programmes and how they related to them in the day-to-day work, because it was changing a lot. Then they had IT training which was a session of just becoming friendly with the palmtops and they go away and play with them. They were also encouraged to bring along some of their most complicated cases of their own, so that they could play with them on the day and talk about them and share that with people. So that related to life and whilst they weren't in the workplace, they were in a room together, they were talking about their clients.' (LH p5-7). 'In three sessions initially. Sort of an introduction to the palmtop, how to turn it on etc. Go away and play with it for a few days - come back and then do the Part 1 training on concepts and then do the training to get the hands-on experience. The system was set up so there was a false case load in the palmtops, with an access contents slip so you can actually put the data in yourself and it be recorded and learn how to use the system that way. I think it probably was linked to real life to a degree and the three professional leads for District Nursing and School Nursing, we invited to the sessions as well, to give their sort of input if staff had any queries from that particular professional group. Di, who is one of the advisors used to be a Health Visitor so she is on the ball, she knows what is happening on the shop floor, with the clinicians and things being responsible for training and development for the professional side, is always aware of what is happening.' (GS p5-7)	support has on the whole made users warm to the system.' (TL p6) l) Training emphasised message that information was for clinicians benefit 'The training always emphasised the message that this was their information for their use.' (DL p9) m) Training managed and explained changes in clinical working practices '**How have these changes in clinical working practices been managed?** I think again, explaining to them about the system, involving them, concepts training, other training, support.'(TL p12). 'I think there is also the issue about ongoing training and maintenance and we have structured that in there, that there will be on going training for staff not just in the current system but also with potential developments in the system as well.'(DL p1)
HIGH	5. User Support 'The help desk had lots of calls from staff who said 'how do I do this?' and 'how do I do that?' when they ought to have been reading their manual which would have told them.' (RJ p6) 'Once the case load was on and they were using the system in a live environment then the trainers were on hand to support so that for the first few days they were on hand they were physically there and then from then on we had a service desk and we had three people who understand to varying degrees how the system works.' (TL p6) 'There's the help desk from the IT side of things where people can call and on the nursing advisory group we have 3 nurse advisors one from each nursing speciality so one from community child health, health visitor and district nurse so staff have direct access to them through a mobile phone if they have any particular problems that they can't address' (DL p7). 'We have tried to reinforce the training with information that has been given in the manuals.' (DL p10) 'Just the availability to purchase extra clerical support or other professional support that they felt they needed plus the support that came from the IM&T Dept with the help line. 'We also had support workers. Three support workers with mobile phones. One for each professional group. They were there to support professional issues.' (LH p9)	n) User Support friendly and supportive of users '**Would you say that user attitudes have been significantly influenced by any other issues during the CIS project?** I think the support has helped a lot. It is giving us positive reassurance that the system is there, that the system is to be used and that it will benefit them in the long run and its in its infancy. I think It try to do that at the end of the day, in the way they talk on the phone, the way they deal with staff, help to reinforce that message anyway. They never say, " You should know what you are doing" sort of attitude, its always, "OK we'll talk you through, how you do this and why you need to do it." I think by having that attitude from them has helped to reassure clinicians that its not a horrible thing that they have to do. Its not a chore to them but its getting Staff to understand that it is part of the role now.' (GS p14) o) Dedicated support means staff feel that they are given attention '**What influence has providing this level of support had on the project?** I think it would have folded without it. I think you need some dedicated resource that actually keeps the momentum of the project going and that staff feel that they are being listened to. At the end of the day there may be some things that we can't solve overnight but

RATING	Variables	Explanations
	‘Every body was given a manual. We have tried to reinforce the fact that they need to use the manual. It is an excellent book. It is very clear and easy to understand. Very basic and even non-IT literate people should be able to understand it. But the staff just don’t read the manual and that’s the problem. Its not the support networks although the support networks are there, but it gets abused because people don’t read the book. I think in terms of the help desk and the user groups and the Clinician Leads for it, I think it works very well.’ (GS p5&10)	they need to know that they have been taken on board, they’ve been listened to, because without that it just becomes another chore and what’s the benefit to them?’ (DL p12)
HIGH	6. User Involvement ‘**At what stages have users been involved in the project?** Well there has been the Project Advisory Team which has been in place now for a while and there is user involvement there. The Organisational Development Advisor would have more detailed information than I have on that but there have been occasions when people have indicated as to what clerical support they might require, what sort of support they needed in the initial stages coming on to it, things like that and through the issue of the CIS Newsletter thing.’ (RJ p3) ‘**At what stages have users been involved in the project?** I think all along. I think that they were involved in the production of the statement of need , some users were involved in reviewing the statement of need. We had many awareness sessions prior to selection. The users decided which system we chose. I wouldn’t have chosen this one.’ (TL p2) ‘There’s a variety of different committees and different advisory groups, so there’s been the nursing advisory group, its also been taken to the professional group so working parties where there are different clinicians. I think we have set up different communication lines so that when people have particular problems there is a forum for that to be discussed, so there are link meetings as well.’ (DL p6). ‘Right back at the consultation process they were involved as I was. We have had some User Support Groups round and about, that has evolved into a Nursing Advisory Group which has got users on it. We also have what we call a Link Meeting now which is a managerial level meeting as in Team Leaders so they manage the multi-disciplinary teams and we meet them about every six weeks and there is somebody from IT there. Rosie and I are there as professional advisors as well as Managers to talk about what their issues are - have they got any problems?’ (LH p3). ‘For most of the clinicians off the shop floor it has always been their professional manager who has had the involvement and has fed back off the shop floor to the main group. The consultation to my knowledge, has been the format of some sessions that the Clinical Development Advisor and actually led with all the three professional groups and that was like a feedback session to see if they were having any problems. The Link Groups with all the Team Leaders as well, who actually feed in information. The Team Leaders as a professional group, all get together with the IT Staff and discuss the development of the System and the Reports and what they can get out of the system and feed back to the staff, along with all the newsletters that are put out.’ (GS p4-6)	p) User Involvement has demonstrated that CIS is for staff benefit ‘**What methods have been used to try and develop this user ownership?** I think by consultation. By user involvement. By listening to what they say and trying to act on that where we can. I believe that not only empowers them to say what they are doing but actually demonstrates that it is their system. That is encouraged as part of the training, you know, the information is yours.’(LH p11) ‘Involvement and they were involved at every point so you couldn’t be able to say that it was an IT person who chose the system, they were involved in choosing it.’(TL p9) ‘Again involvement. Membership of the Project Board; the setting up of the Project Assurance Team; the involvement of the clinical service holders, all those sort of things. The involvement of the staff themselves, Phil’s detailed work with the staff to get them involved with the system has been a major theme has been how to get the users to be involved and how do you get them to defend it.’(RJ p8). q) User involvement has avoided user resistance ‘**So What would you say are the main areas that have really benefited from user involvement?** I don’t think we could have done it without them. I think the system would be in a mess if we hadn’t used local people about their work situation and what would work for them. It would have just ground to a halt. We would probably have had a riot along the way as well.’ (RJ p3) r) User involvement has allayed fears of users ‘I think when you are dealing with a group of staff who largely have little or no IT expertise I think all the IT awareness sessions and the training sessions allayed fears.’ (TL p3) s) Pro-active Involvement of users to influence change ‘More listening. More pro-active and meaningful involvement of the users to influence change.’(LH p12) ‘So what methods were adopted so that these changes in organisational culture had a positive effect on the CIS ? User involvement, awareness, training, support, giving out a consistent message from senior management, focusing on benefits.’ (TL p10) t) User involvement has shown commitment to empowering staff ‘**How have you developed this user empowerment?** I think we have shown a commitment by the variety of groups that we have got involved, so we wanted the end shift to be with staff with the system.’ (DL p2) u) Allow Clinicians to inform development in clinical working practices ‘I think it is also about listening because you don’t want just one person. Yes, the clinical development advisor is there to develop the ideas but you don’t want them to be

RATING	Variables	Explanations
		just his ideas, you want staff also to inform the process.'(DL p8)
HIGH	7. Testing 'At the end of the pilot we decided that we didn't trust Systems Team to deliver software that worked so we had to test it ourselves and that is our tactic now, that whenever we receive a new version we test it. We had a period when we had taken the system and we started playing with it just to get familiar to ourselves and things weren't working so we decided to delay the start of the pilot until we had thoroughly tested the system.' (TL p3). 'It went [piloted] through two teams at Ashfield and they tried and tested everything. I believe it was tested in the IT Dept for practical use of the system, before it ever went to field staff.' (LH p4).	
HIGH	8. Improvement in flow of information 'Its dramatically improved because there is not a paper flow. That patient based information is readily available.'(TL p10). 'The Daily Diary Sheets and all that sort of stuff have stopped, or they have virtually all stopped. So that manual method of collecting data has ceased. The CIS has improved the flow and the accuracy of all executive information.'(RJ p11). 'I think there has been a big move made to actually make the flow of information it a lot simpler and it is a lot easier to get standard reports now.' (DL p5). 'I believe the flow of information is improving.'(LH p12). 'In terms of the information that we get out of the system, currently as a Team Leader we have to get various important parts of information out in terms of numbers, in terms of contacts and failed contacts and appointment times and things. I can actually pull that information out of the system.'(GS p16)	v) CIS is seen as useful 'If a complaint comes in I can actually see and know who has last been in there. It just saves so much time, so much faffing about.'(LH p13). w) Able to defend service which increases morale 'I think staff are been very much reassured by the fact that we haven't just looked at direct activity but we've looked at indirect and it's been very positively received that we've looked at things like case conferences and telephone calls how we're collecting that information. I think staff generally feel quite reassured by the fact that some of the activities that traditionally haven't been collected have now been.'(DL p15)
HIGH	9. User Attitudes 'More positive in the sense of less fearful.' (RJ p6) '**Do you think users have become more positive towards the system during the CIS project?** Definitely. I think a lot of the problems are issues of confidence, the extra work load that is incurred initially and I think that once people get confident, they understand the system, they can do it quicker so the impact on workload is reduced and I think they are fine.' (TL p7). '**Do you think users have become more positive towards the system during the CIS project?** Yes, generally there is. I think there is a lot of evidence of positive in the way people have adapted to using the system.' (DL p13) **'What evidence is there of positive user reactions to the system**? A lot of that is verbal. Some of it will come through the evaluation but I think the most positive one is them asking for more information.' (LH p10) 'Yes, they are becoming more positive and the negatives we are trying to turn round and make them into positives.'(GS p11)	x) Increased demand for information 'I think in terms of Report writing, people coming to me and saying can I get this information? How is this done? That is the best news, that they are taking it seriously and thinking well maybe I can do something with it.' (GS p11) 'In terms of the people where it has been a success is that they are starting to get the ideas for the development and people are coming through, can I have a report on, or wanting to look at the system in terms of what can be collected so I think that can be seen as a positive.' (DL p14)
MOD	10. User Ownership 'We may be a little hard on ourselves, but we still don't believe that we have got adequate user ownership.' (RJ p8) 'Its chicken and egg really. The system has got to be fully working to get some obvious clinical benefits seen by people and at that stage I think the ownership will be a disappearing issue.' (RJ p9) 'Have there been efforts to develop a sense of ownership associated with the system? For about six months now that has been high on my agenda.' (TL p9)	y) Staff will use CIS to improve patient care 'I think that once they own they own it they will try and optimise its use and they will try and explore different ways in which the system can be used to improve the service.' (TL p9) z) Users have more confidence in information 'I think people will feel more confident about the information. I think in the past we have felt that it has not been a true reflection of the work that has been undertaken.'(DL

RATING	Variables	Explanations
	‘Ownership has been a stumbling block.’ (TL p13) ‘**Have there been efforts to try and achieve a sense of user ownership associated with the system?** Yes. Certainly it was important to do this. I think we have learnt a lot from the pilot staff, that we did want them to join the data group, we wanted them to see the importance of it and the value of it and I think that is there, certainly at Team Leader level. I think there is a lot more work to do actually, if you like, tell Staff. I had one comment to me from one of the Project pilot staff that actually said to me, “I can see the value of it from a Team leader, what does it mean to me, a staff Nurse, going to get a patient today, you know give him an enema. What does it mean for me?” I think we have got to try and work harder to get that message through.’ (DL p18) ‘Some are actually saying “ I want this” and “ I want to know this”. That to me says they are now beginning to own it, saying I am putting this in, I want something out of it and its to inform me what I am doing so I can either change it or whatever. However, I don’t think until they get data back for themselves regularly and meaningfully, will they have complete ownership. I think the return of information has been the biggest barrier - the slowness of that.’ (LH p10&11) ‘It is their system and the information that we put in the system and get out of the system is their data at the end of the day. The more accurate they are the better which is what I keep telling them. But I think we are still in the infancy aren’t we and there is still a lot they need to understand what they can get out of the system and I think until they know what they can get out of the system I don’t think they will fully own the system.’ (GS p12)	p4) aa) Management can become more hands off ‘**In what ways do you think achieving user ownership will influence how the Trust operates?** We have become more hands off about it. We just provide the support etc., just as this is done by the other systems. It has emerged that we have now got a system where the people concerned were committed to fully utilising it.’ (RJ p9)
MOD	11. Changes in Clinical working Practices ‘Yes. Because of concepts training, because of how physically they are working, because of logistically how they are working, where they have to go to now compared to where they had to go to before.’(TL p12) ‘The concepts stuff.; they changed the way people perceive their work. When one actually changes the work that they actually do, it should do, it should focus them in different ways.’(RJ p13) ‘I think that it has altered the way that they work. I mean, just sitting in front of somebody with their palmtop, actually alters the way, its a different working style. The way that you would actually have to approach patients and talk to patients around it, getting them used to technology and information.’(DL p1). ‘Our intention is that the system will inform clinical practice. So through the packages of care and reinforcement of good practice.’(DL p7). ‘I suppose it has to a degree in terms of making sure that the records now, the written records actually correspond with the record on the palmtop. So yes, I think it made you think a little more about what you write on the Notes because somebody has got to follow you in and use their palmtop and all the data has got to fit together , so yes I think you become more aware of it. I would hope that it will effect the way we actually work and the way we actually provide care. But it is only when everybody is using the information technology properly will we be able to utilise the data.’(GS p18)	ab) Help inform Clinical Practice ‘Our intention is that the system will inform clinical practice. So through the packages of care and through the reinforcement of good practice. So it’s not just informing the Practitioner its also informing the people who purchase those services as well, to make it a more clinically effective service.’ (DL p8) ‘I would think that, yes, it will affect the way we actually work and the way we actually provide care. But it is only when everybody is using the information technology properly will we be able to utilise the data to improve patient care.’ (GS p18) ac) Changed the way staff think about their work ‘I think it has made them think about the way they work and that they can actually see. I think it has enabled them to move away from gut feel management to something that is truer and perhaps to test their beliefs. ‘I thought we were doing in that way, and oh no, we’re doing it that way and now is that the right way, can we improve?’(TL p9). ad) Collecting new information allowing clinicians to review clinical practice ‘The system works using care objectives and that was not the way our community staff were working although it was supported in the new policy recommendations from the NHS. So we decided that we needed to change direction in the way we provided care and I think the staff saw this as an opportunity to move away from contacts and be in a better position to justify what they do.’ (TL p3-5)
RATING	Variables	Explanations
HIGH POSITIVE	12. Change in Organisational Culture ‘I think that they have become more IT aware which has encouraged them to get involved in other IT developments and to use them.’(TL p9)	ae) Staff more keen to be involved with IT ‘I think there has been this greater awareness around information technology. I think it has got people thinking, more around the benefits of what technology can achieve for

RATING	Variables	Explanations
	‘In what ways do you think the organisational culture of the Trust has changed since staff have been using the CIS? As an organisation I think we are becoming more used to managing with data.’(RJ p9) ‘I don’t think you can get one without the other because some of it is about this awareness raising so if staff are more informed then they are going to come up with more ideas and I think it all feeds into it.’(DL p1) ‘We have tried to say, the system is a tool to help you, its not their to change what you do unless its the information that you gather that says to you, about your clinical practice that you need to review it and that is the cultural change that we are trying to do.’ ‘I think the general organisational attitudinal change. They have become more relaxed. They are more positive. A lot more praise around, a lot less blame. I think the two go together.’(LH p6&10) ‘We have had to have PC’s installed ourselves as downloading points and we have also used the PC’s for everything else. We are using it for other software that is actually on the system in terms of Word and E-mail and the whole culture has changed. We now have a system like E-mail; we don’t use the phone as much and I think the whole has changed the culture in the way we work.’(GS p15)	them.’(DL p4). af) Cultural Change means staff more relaxed ‘I think the general organisational attitudinal change. They have become more relaxed. They are more positive. A lot more praise around, a lot less blame. I think the two go together.’(LH p6&10)
MOD	13. User Empowerment ‘**In terms of empowerment, what changes have their been for users since they have been using the system?** Immediate access to patient based information. Its there with them, they don’t have to go hunting for it and it should tell them all that they need to know.’ (TL p8). **‘Do you think there has been any empowerment of users from using the system?** Yes. I think one or two individuals have grasped that. The team leaders particularly, I think have felt empowered to actually say “ I want a report on ‘x’”. They actually want to look at caseload management and different issues. I think a lot more people are becoming aware of how powerful information can be, comparing caseloads and things, but I think it is in its infancy at the moment.’(DL p2) **‘In terms of empowerment, what changes have their been for users since they have been using the system?** Minimal at this point in time because they are so busy trying to do, or they have been, the earlier ones have been doing both paper and the electronic recording, but that duplication has worried them. Now once they have let go of some of the paper trail, they have felt more empowered I believe. I think that is the biggest change but it has been fairly slow.’ (LH p10**)** ‘I think we are still in the infancy aren’t we and there is still a lot that they need to understand, what they can get out of the system and I think until they know what they can get out of the system, I don’t think we will be able to empower them as to how to put it in.’(GS p12)	ag) Help inform clinical practice ‘I think empowerment will allow a shift more towards informing clinical practice and to actually getting the users involved.’ (DL p2) ah) Able to use information to inform clinical practice ‘I think the next step is that they [clinicians] will look at what they do and I think we have started this with the reporting process. I think they will say, look, we’ve got all this information, we’ve got all this data about he way we work, we can now start to analyse it to see if there is a more effective way of working.’ (TL p8)
LOW	14. Changes in Organisational Structure ‘Do you think there have been any changes in organisational structure since the CIS has been in use ? No.’ (TL p10) ‘Do you think there have been any changes in organisational structure since staff have been using the CIS ? No, not particularly. I think people have had additions to their roles, I don’t know if people have actually moved or changed as a result of the CIS. I think it has been more of an absorption into existing roles.’ (DL p2) ‘Not as a result of the system. I think the organisational changes are more likely because of NHS Directives about commissioning. I don’t think the CIS was made for that. It was there for clinical judgement not to help organisational change as a structure, certainly not at a macro level.’(LH p14) ‘In terms of the structure I don’t think anything else has really changed that much.’(GS p20)	

RATING	Variables	Explanations
LOW	15. Changes in Organisational Processes ‘I don’t think we are there yet. I think at a micro level people doing things differently, things have changed, I think at a macro level I don’t think we have analysed sufficiently the data we have collected to come to any conclusions about the way that we deliver patient care. I think that this is the next massive cultural step that we have to take.’(TL p12) ‘No not yet but they will. This issue of the integration of CIS into the rest of the trusts information systems and that is something which is planned to happen but hasn’t happened as of yet and when that does happen that will alter working practices with programmes of care and multi-disciplinary based and we will understand much more about what is going on.’(RJ p15) ‘No not yet. That’s because the system isn’t fully implemented yet.’(LH p14)	
MOD	16. Changes in Non-Clinical working Practices ‘Yes. I think it is change in system it is a move away from paper. Probably the admin. staff are experiencing a significant change as much as the clinical people.’(TL p11) ‘The system is now able to produce information about what they are doing which means they don’t need to report that manually any more. they have a different way of claiming travelling expenses, those sort of things have changed.’(RJ p12). ‘They have to come in and upload and download. They have to know how to correct. That’s a big change for them.’(LH p13) ‘I use the main PC more, probably more than I ever would have done. I would probably have used it as a glorified typewriter if I wasn’t using it to pull off reports; if I wasn’t using it to send e-mails about reports, and vice versa, so yes my non-clinical work has changed as a direct result of having the CIS.’(GS p17)	