IT-Enabled Change: A Contextual Evaluation Of An Improvisational Perspective

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ABSTRACT

This dissertation presents a review of change management literature and the findings of an empirical study into a hierarchical organization's experience with the adoption and use of non-adaptive information technology. The findings are grounded in the theory from Orlikowski and Hofman's (1997) study which provides a generalized improvisational perspective of the change process. This perspective is extended by this research with insights from a review of the existing formal theory and with interpretations from a contextual case study. Using a grounded theory research approach, the study examines an organization's experiences in terms of any anticipated, opportunity-based or emergent changes to their processes, structure and culture that were enabled by the introduction of non-adaptive technology. The findings build upon Orlikowski and Hofman's (1997) Improvisational Change Model by evaluating the model in a different organizational and technological context to that of the original study. The findings reveal that ongoing improvisational changes can occur in hierarchical organizations and that improvisations and adaptations can occur in organizations which adopt non-adaptive IT provided that ongoing support for change management is forthcoming. The findings also suggest that there is a correlation between the level of customer dissatisfaction and the emergence of any local improvisations regardless of the organization type. The research concludes that an improvisational perspective may be useful for hierarchical organizations which introduce new technology as the local improvisations which can occur may be leveraged for advantage.

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INTRODUCTION

1.1 PROBLEM DEFINITION

As we approach the twenty first century there can be little doubt that successful organizations of the future must be prepared to embrace the concept of change management. Change management has been an integral part of organizational theory and practice for a long time, however, many theorists and practitioners now believe that the rate of change that organizations are subjected to is set to increase significantly in the future. Indeed, some even go so far as to suggest that the future survival of all organizations will depend on their ability to successfully manage change (Burnes 1996; Peters 1989; Toffler 1983).

It could be argued that the study of organizational change management should be the preserve of the social scientist or the business manager. After all, much of the theory has evolved from social and business studies and not from the field of computer science. However, information systems do not exist in a vacuum and It is widely accepted that technology, particularly Information Technology (IT), is one of the major enablers of organizational change (Markus and Benjamin 1997; Scott-Morton 1991). The successful development of any information system must address sociological issues including the effects of the system itself on the organization into which it is introduced. Paul (1994) maintains that information systems must be developed specifically for change as they must constantly undergo change to meet changing requirements. Clearly, organizational change is an important issue for the information systems researcher.

1.2 STUDY SCOPE

This dissertation will focus on the topic of organizational change management from an information systems perspective. The study will examine the issues raised during a review of the change management literature which will be related to the findings of a case study of an organization that experienced a number of IT-enabled changes. As in the Management In The 90s (MIT90s) study (Scott-Morton 1991), a very broad

definition of the term IT is used to include: computers of all types, hardware, software, communications networks and the integration of computing and communications technologies.

Specifically, this dissertation will focus on the Improvisational Change Model proposed by Orlikowski and Hofman (1997) which was based on an extended case study of a modern, network organization which integrated adaptive technology into its core business processes.

1.3 STUDY OBJECTIVES

The objective of this dissertation is to build upon Orlikowski and Hofman's (1997) Improvisational Change Model by evaluating the model in a different organizational and technological context to that of the original study.

This dissertation will focus on a contextual evaluation of Orlikowski and Hofman's (1997) improvisational perspective of IT-enabled change. In contrast to the original study, Orlikowski and Hofman's (1997) Improvisational Change Model will be evaluated in the context of a hierarchical organization which has adopted a non-adaptive technology. The improvisational perspective will be evaluated with the findings from a review of the change management literature which will be undertaken to provide insights from the existing formal theory. A grounded theory case study will then be undertaken to examine the experience's of a hierarchically organization which has integrated non-adaptive workflow technology into its core business processes.

1.3.1 Dissertation Outline

The remainder of this section provides an outline of the contents of each chapter within this dissertation:

- Chapter 2 provides a review of the change management literature from both the social sciences and the information systems perspectives. The major change management approaches from the management sciences will be identified and the main issues raised by this examination will be related to a discussion of the change management models that have been adopted by the IS community. A description of Orlikowski and Hofman's (1997) Improvisational Change Model is given followed by a summary of their conclusions and recommendations for further research.

- Chapter 3 will discuss what was expected from the grounded theory case study based on the assumptions or preconceptions made about the chosen organization and its technology and also what IT-enabled changes were expected to have been implemented following the introduction of the new technology.

- Chapter 4 will give the rationale for the data collection techniques used during the case study and it will specify the data collected by each method. It will also provide a description of the case study organization, the technology and the IT-enabled changes. This description is based on the actual data gathered during the case study using the different data collection techniques.

- Chapter 5 will discuss the issues raised when the case study expectations were not supported by the findings. The chapter will begin by examining the implications of the unexpected differences between the case study context and Orlikowski and Hofman's (1997) Improvisational Change Model. The chapter will then examine the reasons for the unexpected changes that occurred to the case study organization following the introduction of the new technology.

- Chapter 6 will examining the findings of the research which were supported by the case study data. The chapter will then summarize what has been achieved by relating the findings of the research to the objectives which are discussed in the Chapter 1.

1.4 STUDY CURRICULUM

This study was conducted using an extensive literature search and a case study at a Royal Air Force unit called The Radio Introduction Unit. A detailed description of this organization is given in Appendix C. Preliminary work was also undertaken to determine the most suitable research method to use for this project and the supportive reading lists gives appropriate references.

1.4.1 The Literature Search

The study initially focused on identifying the major protagonists in the management sciences field of change management. The search commenced with a review of the available on-line databases and of the library catalogues for books and articles referenced under the keywords, *change management*. This search revealed many general change management references, mostly from the social science and business studies fields.

The search was then confined to finding books and articles referenced under the keywords, *change management* and *Information Technology*. Many useful references, including the core articles by Orlikowski (1996) and Orlikowski and Hofman (1997), were found using the INSPEC database at the library of The Institution of Electrical Engineers(IEE). An attempt was also made to locate any recent research in this field using the research indices. Finally, referenced work from retrieved articles and books were obtained as appropriate.

1.4.2 Research Method

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A grounded theory research method was adopted for this dissertation and the phenomenon studied was IT-enabled organizational change. It was anticipated that a theory could be inductively derived from a suitable case study to build upon Orlikowski and Hofman's Improvisational Change Model (1997). A detailed discussion of the grounded theory research method is given in Appendix B and a personal evaluation of the suitability of this approach for this study can be found in Appendix A.

1.5 SUMMARY

The unstable environmental conditions in which modern organizations operate mean that the ability to successfully manage organizational change has become a key competitive asset. Information technology is one of the major enablers of organizational change and, therefore, organizational change management is an important issue for the information systems theorist and practitioner.

This dissertation will focus on organizational change management from an information systems perspective by relating the issues raised in a study of the related literature to the phenomenon of IT-enabled organizational change observed during a suitable case study. Specifically, this dissertation will focus on the Improvisational Change Model proposed by Orlikowski and Hofman (1997) which was based on an extended case study of a modern, networked organization that integrated an adaptive technology into its core business processes.

The objective of this dissertation is to build upon Orlikowski and Hofman's (1997) Improvisational Change Model by evaluating the model in a different organizational and technological context to that of the original study. Specifically, the improvisational perspective will be evaluated with the findings from a review of the change management and from a grounded theory case study which will examine the experience's of a hierarchically organized Royal Air Force unit which integrated non-adaptive technology into its core business processes.

Chapter 2

LITERATURE REVIEW

INTRODUCTION

Many of the theories and models relating to the management of organizational change have evolved from the social sciences (Burnes 1996; Bate 1994; Dawson 1994). Information Systems (IS) research is of course a much newer discipline. However, the socio-technical nature of information systems is now recognised and many of the IS theories and models have been adopted and adapted from the social sciences (Yetton *et al.* 1994; Benjamin and Levinson 1993).

This chapter presents a discussion on the change management literature drawn from a social science perspective which is then related to an IS perspective of IT-enabled change. The chapter will begin by giving a broad overview of change management and examining the nature of change and its applicability to the IS field. The chapter will then briefly examine the foundations of change management theory. Specifically, the three main theories that underpin the different approaches to change management are examined which concentrate on individual, group and organization-wide change respectively.

The chapter will then examine the major approaches to change management, namely, the planned, emergent and contingency approaches. The planned approach to change, based on the work of Lewin (1958), has dominated change management theory and practice since the early 1950s. The planned approach views the change process as moving from one fixed state to another. In contrast, the emergent approach, which appeared in the 1980s (Burnes 1996), views change as a process of continually adapting an organization to align with its environment. The contingency approach is a hybrid approach which advocates that there is not 'one best way' to manage change.

The chapter will then examine change management within the context of IS theory and practice. In particular, the chapter will investigate the fundamental characteristics of IT-enabled change and will discuss how this is different to the management of change in pure social systems.

Finally, the Improvisational Change Model proposed by Orlikowski and Hofman (1997) will be examined in detail. This model is based on the same principles as the emergent approach to change management and, similarly, Orlikowski and Hofman maintain that their model is more suitable than the traditional Lewinian models for modern, networked organizations using adaptive technologies.

2.1 CHANGE MANAGEMENT

Although it has become a cliché, it is nevertheless true to say that the volatile environment in which modern organizations find themselves today mean that the ability to manage change successfully has become a competitive necessity (Burnes 1996; Kanter 1989; Peters and Waterman 1982). The aim of this section is to provide a broad overview of the substance of change and of change management.

Organizational change is usually required when changes occur to the environment in which an organization operates. There is no accepted definition of what constitutes this environment, however, a popular and practical working definition is that the environmental variables which influence organizations are political, economical, sociological and technological (Jury 1997).

Change has been classified in many different ways. Most theorists classify change according to the type or the rate of change required and this is often referred to as the substance of change (Dawson 1994). Bate (1994) proposes a broad definition for the amount of change which he argues may be either *incremental* or *transformational*. Bate maintains that incremental change occurs when an organization makes a relatively minor change to its technology, processes or structure whereas transformational change occurs when radical changes programmes are implemented. Bate also argues that modern organizations are subject to continual environmental change and consequently they must constantly change to realign themselves.

Although there is a general recognition for the need to successfully manage change in modern organizations, questions regarding the substance of change and how the process can be managed in today's context remain largely unanswered. There are numerous academic frameworks available in the management literature that seek to explain the issues related to organizational change and many of these frameworks remain firmly rooted in the work of Lewin (1958). Dawson (1994) points out that, almost without exception, contemporary management texts uncritically adopt Lewin's 3-stage model of planned change and that this approach is now taught on most modern management courses. This planned (Lewinian) approach to organizational change is examined in detail in Section 2.3.

Information systems are inherently socio-technical systems and, therefore, many of the theories and frameworks espoused by the social sciences for the management of change have been adopted by the IS community. Consequently, even the most modern models for managing IT-enabled change are also based on the Lewinian model (Benjamin and Levinson 1993). Figure 2.1 depicts the most popular and prominent models for understanding organizational change which are examined in detail in Sections 2.3, 2.4 and 2.5. In

Section 2.6 these models will be compared with the main change management models adopted by the IS community.
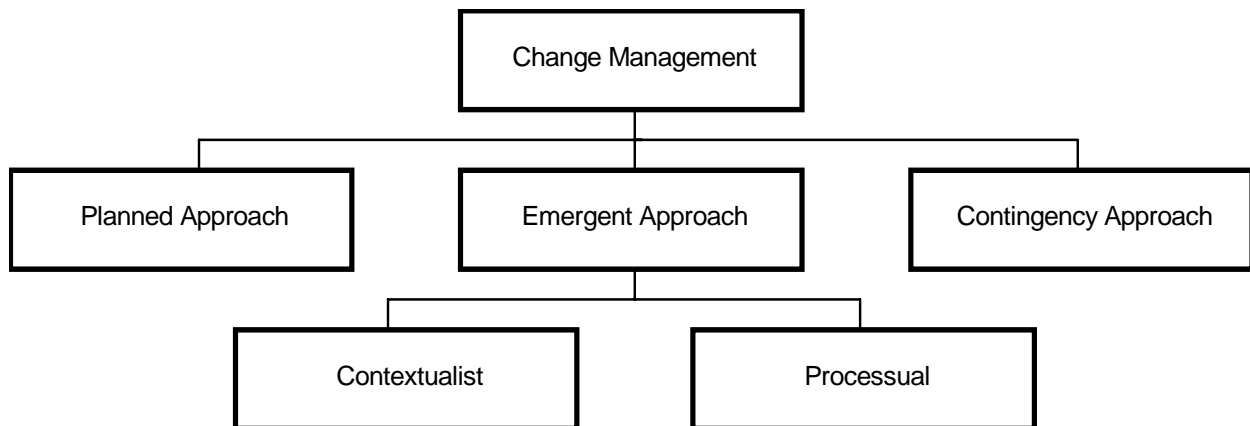
Figure 2.1 - Principal Change Management Models

2.2 THEORETICAL FOUNDATIONS

Change management theories and practice originate from different, diverse, social science disciplines and traditions. Consequently, change management does not have clear and distinct boundaries and the task of tracing its origins and concepts is extremely difficult. This section will briefly examine the foundations of change management theory as these foundations underpin the discussions in Sections 2.3, 2.4 and 2.5 concerning the most prominent models for understanding organizational change.

Whatever form change takes and whatever the required outcomes of any change initiative, managers responsible for implementing change must address the management issues at either an individual, group or organizational level. It may also be argued that a successful change programme must address the management issues at all levels. Three of the main theories upon which change management theory stands are: the individual, group dynamics and the open systems perspectives which are summarized in the remainder of this section.

2.2.1   The Individual Perspective

The individual perspective school is divided into two factions know as the Behaviourists and the Gestalt-Field psychologists[1]. Behaviourists believe that behaviour is caused by an individual's interaction with the environment. The basic principle of this approach, which originates from Pavlov's (1927) work, is that human actions are conditioned by their expected consequences. Put simply, this means that rewarded behaviour is repeated while ignored behaviour tends not to be repeated. Gestalt-Field protagonists, however, believe that behaviour is not just caused by external stimuli, but that it arises from how an individual uses reason to

interpret these stimuli. Behaviourists attempt to effect organizational change by modifying the external stimuli acting upon the individual whereas Gestalt-Field theorists seek to change individual self-awareness to promote behavioural and thus organizational change.

2.2.2   The Group Dynamics Perspective

Group dynamics theorists believe that the focus of change should be at the group or team level and that it is ineffectual to concentrate on individuals to bring about change as they will be pressured by the group to conform. The group dynamics school has been influential in developing the theory and practice of change management and of all the schools they have the longest history (Schein 1969). Lewin (1958) maintains that the emphasis on effecting organizational change should be through targeting group behaviour rather than individual behaviour since people in organizations work in groups and, therefore, individual behaviour must be seen, modified or changed to align with the prevailing values, attitudes and norms (culture) of the group. The group dynamics perspective manifests itself as the modern management trend for organizations to view themselves as teams rather than merely as a collection of individuals.

2.2.3   The Open Systems Perspective

Proponents of the open systems perspective believe that the focus of change should be neither on the individual nor on the group but that it should be on the entire organization (Burnes 1996). Organizations are viewed as a collection of interconnected sub-systems and the open systems approach is based on analyzing these sub-systems to determine how to improve the overall functioning of the organization. The sub-systems are regarded as *open* because they interact not only internally with each other but also with the external environment. Therefore, internal changes to one sub-system affect other sub-systems which in turn impact on the external environment (Buckley 1968). The open systems perspective focuses on achieving overall synergy rather than on optimizing any one individual sub-system (Mullins 1989).

Burke (1980) maintains that this holistic approach to understanding organizations is reflected in an different approach to change management which is driven by three major factors: interdependent sub-systems, training and management style. An organization's sub-systems are regarded as interdependent and Burke argues that change cannot occur in one sub-system in isolation without considering the implications for the other sub-systems. He also argues that training cannot achieve organizational change alone as it concentrates on the individual and not the organizational level. Burke also maintains that modern organizations must adopt a consultative management approach rather than the more prevalent controlling style epitomized by Taylor's (1911) famous work.

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[1] **Gestalt**. psychol. an organized whole that is perceived as more than the sum of its parts. COD, 9th Ed.

2.3 THE PLANNED APPROACH

Much of the literature relating to the planned approach to organizational change is drawn from Organizational Development (OD) practice and numerous OD protagonists have developed models and techniques as an aid to understanding the process of change (Dawson 1994). The origins of most of the developments in this field can be traced to the work of Lewin (1958) who developed the highly influential Action Research and Three-Phase Models of planned change which are summarized in the remainder of this section.

2.3.1   The Action Research Model

Lewin (1958) first developed the Action Research (AR) model as a planned and collective approach to solving social and organizational problems. The theoretical foundations of AR lie in Gestalt-Field and Group Dynamics theory which are summarized in Section 2.2. Burnes (1996) maintains that this model was based on the basic premise that an effective approach to solving organizational problems must involve rational, systematic analysis of the issues in question.

AR overcomes *"paralysis through analysis"* (Peters and Waterman 1982, pp221) as it emphasizes that successful action is based on identifying alternative solutions, evaluating the alternatives, choosing the optimum solution and, finally, that change is achieved by taking collective action and implementing the solution. The AR approach advocates the use of a change agent and focuses on the organization, often represented by senior management. The AR approach also focuses on the individuals affected by the proposed change. Data related to the proposed change is collected by all the groups involved and is iteratively analyzed to solve any problems. Although the AR approach emphasizes group collaboration, Burnes (1996) argues that cooperation alone is not always enough and that there must also be a *'felt-need'* by all the participants.

2.3.2   The Three-Phase Model

Lewin's ubiquitous Three-Phase model (1958) is a highly influential model that underpins many of the change management models and techniques today (Burnes 1996; Dawson 1994). The main thrust of this model is that an understanding of the critical steps in the change process will increase the probability of successfully managing change. Lewin (1958) also argues that any improvement in group or individual performance could be prone to regression unless active measures are take to institutionalize the improved performance level. Any subsequent behavioural or performance change must involve the three-phases of unfreezing the present level, moving to a new level and refreezing at the new level. Lewin (1958) argues that there are two opposing sets of forces within any social system; these are the driving forces that promote change and the resisting forces that maintain the status quo. Therefore, to unfreeze the system the strength

of these forces must be adjusted accordingly. In practice the emphasis of OD practitioners has been to provide data to unfreeze the system by reducing the resisting forces (Dawson 1994). Once these negative forces are reduced the organization is moved towards the desired state through the implementation of the new system. Finally, refreezing occurs through a program of positive reinforcement to internalize new attitudes and behaviour. Burnes (1996) argues that this model merely represents a logical extension to the AR model as unfreezing and moving respectively equate to the research and action phases of the AR model.

Lewin's Three-Phase model of planned change has since been extended by numerous theorist to enhance its practical application including the Lippitt *et al.* (1958) seven-phase model and the Cummings and Huse (1989) eight-phase model. All these models are based on the planned approach to change management and, according to Cummings and Huse (1989), they all share one fundamental concept:

> *"the concept of planned change implies that an organization exists in different states at different times and that planned movement can occur from one state to another"*

The implications of this concept are that an understanding of planned organizational change cannot be gained by simply understanding the *processes* which bring about change, it is also necessary to understand the *states* that an organization passes through before attaining the desired future state (Burnes 1996).

2.4 THE EMERGENT APPROACH

Within the social sciences, an approach described by Burnes (1996) as the emergent approach is a popular contemporary alternative to the planned approach to the management of change. The emergent approach was popularized in the 1980s and includes what other theorists have described as processual or contextualist perspectives (Dawson 1994). However, these perspectives share the common rationale that change cannot and should not be 'frozen' nor should it be viewed as a linear sequence of events within a given time period as it is with a planned approach. In contrast, with an emergent approach, change is viewed as a continuous process.

The modern business environment is widely acknowledged to be dynamic and uncertain and consequently, theorists such as Wilson (1992) and Dawson (1994) have challenged the appropriateness of a planned approach to change management. They advocate that the unpredictable nature of change is best viewed as a process which is affected by the interaction of certain variables (depending on the particular theorist's perspective) and the organization.

Dawson (1994) proposed an emergent approach based on a processual perspective which he argues is not prescriptive but is analytical and is thus better able to achieve a broad understanding of change management within a complex environment. Put simply, advocates of the processual perspective maintain

that there cannot be a prescription for managing change due to the unique temporal and contextual factors affecting individual organizations. This perspective can be succinctly summarized with the following quote:

> *"Change needs to be managed as an ongoing and dynamic process and not a single reaction to adverse contingent circumstance".* (Dawson 1994, pp182)

For advocates of the emergent approach it is the uncertainty of the external environment which makes the planned approach inappropriate. They argue that rapid and constant changes in the external environment require appropriate responses from organizations which in turn force them to develop an understanding of their strategy, structure, systems, people, style and culture and how these can affect the change process (Dawson 1994; Pettigrew and Whipp 1993; Wilson 1992). This has in turn led to a requirement for a 'bottom-up' approach to planning and implementing change within an organization. The rapid rate and amount of environmental change has prevented senior managers from effectively monitoring the business environment to decide upon appropriate organizational responses. Pettigrew and Whipp (1993) maintain that emergent change involves linking action by people at all levels of a business. Therefore, with an emergent approach to change, the responsibility for organizational change is devolved and managers must take a more enabling rather than controlling approach to managing.

Although the proponents of emergent change may have different perspectives there are, nevertheless, some common themes that relate them all. Change is a continuous process aimed at aligning an organization with its environment and it is best achieved through many small-scale incremental changes which, over time, can amount to a major organizational transformation. Furthermore, this approach requires the consent of those affected by change it is only through their behaviour that organizational structures, technologies and processes move from abstract concepts to concrete realities (Burnes 1996).

2.5 THE CONTINGENCY APPROACH

Burns and Stalker (1961) established a contingent relationship between an organization and its environment and the need to adapt to that environment. Perhaps more importantly, they also showed that there was more than 'one best way' to do this. In contrast to both the planned and the emergent approaches to change management, the basic tenet of the contingency approach to change management is that there is no 'one best way' to change.

Although British theorists acknowledge that contingency theory has contributed significantly to organizational design theory, they do not acknowledge that it has had the same impact on change management theory (Burnes 1996; Bate 1994). However, within North America and Australia a rational model of change based on a contingency perspective has prevailed therefore this section will briefly discuss this approach (Dawson 1994).

A contingency approach has been taken by Dunphy and Stace (1993) who proposed a model of organizational change strategies and developed methods to place an organization within that model. Dunphy and Stace (1993) maintain that their model reconciles the opposing views of the planned and emergent theoretical protagonists.

It can be argued that the planned and emergent approaches to change management are equally valid but that they apply to different organizational circumstances. For example an organization facing constant and significant environmental changes may find an emergent approach to change management more appropriate than a planned approach. In short, a model of change could embrace a number of approaches with the most suitable approach being determined by the organization's individual environment. The resultant continuum can be seen in Figure 2.2:

ENVIRONMENT

Stable   Turbulent

Planned   Emergent

APPROACHES TO CHANGE
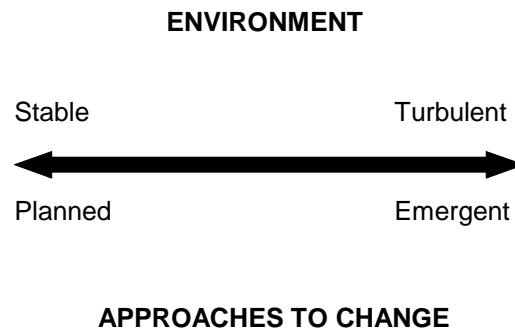
Figure 2.2 - The Change Management Continuum (Burnes 1996, pp.197)

Contingency theory is a rejection of the 'one best way' approach taken by the majority of change management protagonists. This approach adopts the perspective that an organization is 'contingent' on the situational variables it faces and therefore, organizations must adopt the most appropriate change management approach. Burnes (1996, p58) summed this up concisely when he said:

"…the 'one best way' for all organizations is replaced with the 'one best way' for each organization"

2.6 IT-ENABLED ORGANIZATIONAL CHANGE

Previous sections of this chapter have dealt with the different approaches to managing organizational change taken from a social science perspective. Regardless of which model is adopted, the requirement for an organization to change is generally caused by changes in its environmental variables which many academics and practitioners agree are political, economic, sociological and technological (Jury 1997; Scott-Morton 1991). This section will focus on one of these environmental variables, namely technology, in the specific form of IT, and will examine the major issues that are particular to IT-enabled change.

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Woodward's (1965) study demonstrated the need to take into account technological variables when designing organizations and this gave credibility to the argument for technological determinism which implies that organizational structure is 'determined' by the form of the technology. However, despite the general acceptance that the application of change management techniques can considerably increase the probability of a project's success, many IT-enabled change projects have failed for non-technical reasons. Some projects, such as the London Ambulance Service Computer Aided Dispatch System have failed with fatal consequences (Benyon-Davies 1995). Markus and Benjamin (1997) attribute this to what they describe as the magic bullet theory of IT whereby IT specialists erroneously believe in the magic power of IT to create organizational transformation. Some academics argue that although IT is an *enabling* technology it cannot by itself *create* organizational change (Markus and Benjamin 1997; McKersie and Walton 1991).

McKersie and Walton (1991) maintain that to create IT-enabled organizational change it is necessary to actively manage the changes. They also argue that the effective implementation of IT is, at its core, a task of managing change. The Management In The 1990s (MIT90) program (Scott-Morton 1991) proposed a framework for understanding the interactions between the forces involved in IT-enabled organizational change. A simplified adaptation of this framework is shown in Figure 2.3.
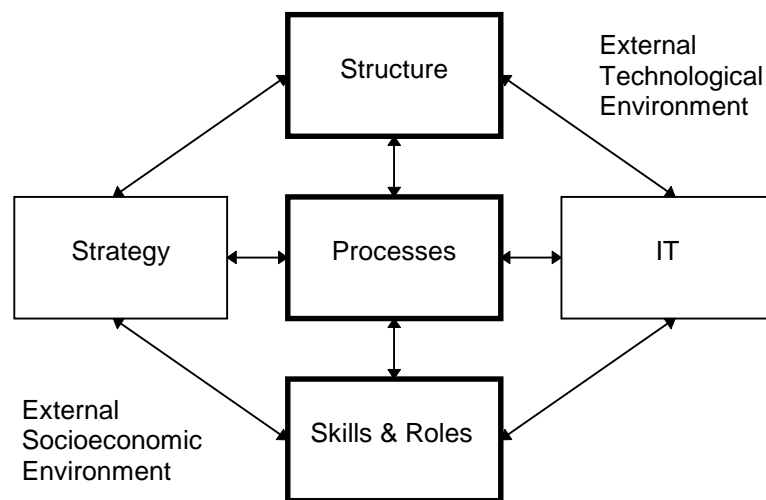
Figure 2.3 - Adapted From The MIT90s Framework

Proponents of the MIT90s model maintain that to successfully manage IT-enabled change it is necessary to ensure that the organizational choices, the technology and the strategic choices depicted in Figure 2.3 are properly aligned (Scott-Morton 1991). In contrast however, Yetton *et al.* (1994) challenge the view that the critical issue in managing IT successfully is alignment. They argue that IT can be used deliberately to modify an organization's strategy and also that the MIT90s framework is a static model that does not address the dynamic nature of change. Nonetheless, despite this criticism, the MIT90s study has been highly influential to IS academics and practitioners (Yetton *et al.* 1994; Benjamin and Levinson 1993). The MIT90s study concluded that the benefits of IT are not generally being realized by organizations because investment is

biased towards technology and not towards managing changes in organizational processes, structure and culture.

Benjamin and Levinson (1993) maintain that IT-enabled change is different from change which is driven by other environmental concerns. They argue that skills, jobs and organizational control processes change radically. Zuboff (1988) also described the revolutionary changes in jobs and control processes within organizations that take full advantage of IT as workers become 'informated' and thus empowered. Jarvenpaa and Ives (1994) provide a vision of the affect of IT-enabled changes on basic work methods as organizations become global networked organizations to take advantage of collaborative work methods. IT-enabled changes also span across functions and organizations as technology enables increased inter and intra-organizational coordination with decreased transaction costs (Kalakota and Whinston 1996).

Many academics and practitioners would agree that IT-enabled change is different from more general change processes and that change must be managed to be successful (Yetton *et al.* 1994; Benjamin and Levinson 1993). Clearly, the change process must be understood to be managed and a number of models have been proposed for this. One such model is Benjamin and Levinson's (1993) which draws on the general change management literature to develop a framework for managing IT-enabled change. This framework is typical of many IS change models (Orlikowski and Hofman 1997) which have been adopted and adapted from the social sciences and are based on the Lewinian unfreeze, change and refreeze approach to change management discussed previously in Section 2.3.2. However, in a situation reminiscent of the developments within the social sciences, a number of new IT-enabled change management models are now emerging which are based on the emergent or contingent approaches to change management.

2.7 ORLIKOWSKI AND HOFMAN'S IMPROVISATIONAL CHANGE MODEL

Orlikowski and Hofman (1997) have proposed an improvisational model for managing technological change which is an alternative to the predominant Lewinian models. They maintain that IT-enabled change managers should take as a model the Trukese navigator who begins with an objective rather than a plan and responds to conditions as they arise in an ad-hoc fashion. They also argue that traditional Lewinian change models are based on the fallacious assumption that change occurs only during a specified period whereas they maintain that change is now a constant. This is similar to the arguments of the proponents of the emergent change management approach which were examined in Section 2.4.

The origins of Orlikowski and Hofman's (1997) Improvisational Change Model can be found in a study by Orlikowski (1996) which examined the use of new IT within one organization over a two year period. The study concluded by demonstrating the critical role of situated change enacted by organizational members using groupware technology over time. Mintzberg (1987) first made the distinction between deliberate and emergent strategies and Orlikowski argues that the perspectives which have influenced studies of IT-enabled organizational change have similarly neglected *emergent* change. Orlikowski challenges the

arguments that organizational change must be planned, that technology is the primary cause of technology-based organizational transformation and that radical changes always occur rapidly and discontinuously. In contrast, she maintains that organizational transformation is an ongoing improvisation enacted by organizational actors trying to make sense of and act coherently in the world.

2.7.1 Model Assumptions and Types of Change

Orlikowski and Hofman's (1997) Improvisational Change Model is based on two major assumptions. First, that changes associated with technology implementations constitute an ongoing process rather than an event with an end point after which an organization can return to a state of equilibrium. Second, that every technological and organizational change associated with the ongoing process cannot be anticipated in advance. Based on these assumptions, Orlikowski and Hofman (1997) have identified three different types of change:

- Anticipated Change. Anticipated changes are planned ahead of time and occur as intended. For example the implementation of e-mail that accomplishes its intended aim of facilitating improved communications.

- Opportunity-Based Change. Opportunity-Based changes are not originally anticipated but are intentionally introduced during the ongoing change process in response to an unexpected opportunity. For example, as companies gain experience with the World Wide Web they may deliberately respond to unexpected opportunities to leverage its capabilities.

- Emergent Change. Emergent changes arise spontaneously from local innovation and that are not originally anticipated or intended. For example the use of e-mail as an informal grapevine for disseminating rumors throughout an organization.

Orlikowski and Hofman (1997) maintain that both anticipated and opportunity-based changes involve deliberate action in contrast to emergent changes which arise spontaneously and usually tacitly from organizational members' actions over time. Furthermore, they contend that the three types of change usually build iteratively on each other in an undefined order over time. They also argue that practical change management using the Improvisational Change Model requires a set of processes and mechanisms to recognize the different types of change as they occur and to respond effectively to them.

2.7.2 Critical Enabling Conditions

Orlikowski and Hofman (1997) suggest that there are certain enabling conditions which must be fulfilled to allow their Improvisational Change Model to be successfully adopted for implementing technology within an organization. The first of these enabling conditions is that dedicated resources must be allocated to provide ongoing support for the change process which Orlikowski and Hofman (1997) maintain is inherently

continuous. They also suggest that another enabling condition is the interdependent relationship between the organization, the technology and the change model as depicted in Figure 2.4.
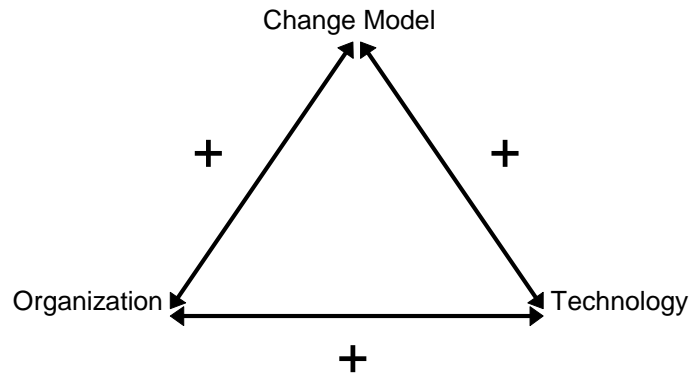
Figure 2.4 - Aligning the Key Change Dimensions (Orlikowski and Hofman 1997, pp.18)

Orlikowski and Hofman's (1997) research suggested that the interaction between these key change dimensions must ideally be aligned or at least not in opposition. Their research also suggested that an Improvisation Change Model may only be appropriate for introducing open-ended technology into organizations with adaptive cultures. Open-ended technology is defined by them as technology which is locally adaptable by end users with customizable features and the ability to create new applications. They maintain that open-ended technology is typically used in different ways across an organization. Orlikowski and Hofman appear to share similar views to the contingency theorists which were examined in Section 2.5 as they do not subscribe to the view that there is 'one best way' for managing IT-enabled change.

Orlikowski's (1996) research, upon which Orlikowski and Hofman's (1997) Improvisational Change Model is based, concluded that further empirical research was needed to determine the extent to which an improvisational perspective of organizational change is useful in other contexts and how different organizational and technological conditions influence the improvisations attempted and implemented.

2.8 SUMMARY

The dominant theories and models relating to the management of change have evolved from the social sciences. IS research is relatively much newer and the socio-technical nature of information systems has caused most IS theories and models to be adapted from the social sciences. The main theories that provide the foundation for general change management approaches are the individual, group dynamics and the open systems perspectives. The planned approach to change management tends to concentrate on changing the behaviour of individuals and groups through participation. In contrast, the newer emergent approach to change management focuses on the organization as an open system with its objective being to continually realign the organization with its changing external environment.

Lewin's (1958) model is a highly influential planned approach model that underpins many of the change management models and techniques today and most contemporary management texts adopt this 3-phase

unfreeze, change and refreeze model. The rationale of the newer emergent approach is that change should not be 'frozen' or viewed as a linear sequence of events but that it should be viewed as an ongoing process. Contingency theory is a rejection of the 'one best way' approach taken by planned and emergent protagonists. The contingency approach adopts the perspective that an organization is 'contingent' on the situational variables it faces and, therefore, it must adopt the most appropriate change management approach.

Many IT-enabled change projects fail despite the general acceptance that change management can considerably increase the probability of a project's success. This is often attributable to the misconception that IT is not only an *enabling* technology but that it can also *create* organizational change. The highly influential MIT90s framework is useful for understanding the interactions between the forces involved in IT-enabled organizational change which must be aligned to create successful organizations.

IT-enabled change is different from changes driven by other environmental concerns and the process must be understood to be managed. Consequently, many IS change models have adopted and adapted the Lewinian unfreeze, change and refreeze approach to change management. However, in a situation reminiscent of the developments within the social sciences, a number of new IT-enabled change management models are now emerging which are based on the emergent or contingent approaches to change management.

Orlikowski and Hofman (1997) have proposed an improvisational model for managing technological change as one alternative to the predominant Lewinian models. This improvisational model is based on the assumptions that technological changes constitute an ongoing process and that every change associated with the ongoing process cannot be anticipated beforehand. Based on these assumptions Orlikowski and Hofman have identified three different types of change, namely, anticipated, opportunity-based and emergent changes. Both anticipated and opportunity-based changes involve deliberate action in contrast to emergent changes which arise spontaneously and usually tacitly from organizational actors' actions over time. These three types of change build iteratively on each other in an undefined order over time. Orlikowski and Hofman (1997) suggest that the critical enabling conditions which must be fulfilled to allow their Improvisational Change Model to be successfully adopted for implementing technology are aligning the key dimensions of change and allocating dedicated resources to provide ongoing support for the change process.

Orlikowski's (1996) study concludes that further empirical research is needed to determine the extent to which an improvisational perspective of organizational change is useful in other contexts and how different organizational and technological conditions influence the improvisations attempted and implemented.

Chapter 3

CASE STUDY CRITERIA AND EXPECTATIONS

INTRODUCTION

This chapter will discuss what was expected from the case study by relating the main points of Orlikowski and Hofman's (1997) Improvisational Change Model to any assumptions or preconceptions concerning the research method and the case study site which were based upon the researcher's personal and theoretical sensitivity. The purpose of this is to minimize any bias that the researcher's sensitivity could bring to this qualitative study by recognizing any assumptions or preconceptions before the case study commenced. Any disparity between the expected outcome of the case study and the actual outcome will be evaluated in Chapter 5.

The criteria for a suitable research method and case study site were driven by the major objective of this study which is to determine if Orlikowski and Hofman's (1997) Improvisational Change Model is a relevant model to explain the process of IT-enabled change in a different context to that of the original study. This chapter will begin by providing a brief explanation of why a grounded theory research method was considered suitable for this study and it will also provide a discussion of the significance of sensitivity. The chapter will then examine the organizational and technological criteria for selecting an appropriate case study site. This is followed by a brief description of the actual site chosen including an explanation of how it fulfills the organizational and technological criteria. It is important to realize that this is a description of how the site was perceived before the case study began. Finally, the chapter will examine the main points of Orlikowski and Hofman's (1997) Improvisational Change Model and relate them to any assumptions or preconceptions concerning the chosen research method and case study site in order to outline the expectations of the case study.

3.1 GROUNDED THEORY AND SENSITIVITY

A grounded theory research method was adopted for this dissertation. A detailed discussion of the method and its terminology can be found in Appendix B. A grounded theory approach can be used to inductively derive a theory about a phenomenon and it is particularly appropriate when applied to research domains that do not have accepted theories or where it is anticipated that an induced theory could expand upon existing speculative theories (Strauss and Corbin 1990). The grounded theory approach was considered particularly suitable for this study as the phenomenon under investigation was IT-enabled organizational change which is a relatively new research topic. Specifically, it was anticipated that data could be inductively derived from a suitable case study to build upon Orlikowski and Hofman's (1997) Improvisational Change Model.

Theoretical sensitivity is an important concept in grounded theory research. Strauss and Corbin (1990) maintain that a researcher's theoretical sensitivity emanates from both their personal and professional experience and also from their exposure to relevant technical literature which sensitizes the grounded theory researcher to the field of study. Professional experience is derived from exposure to a particular field where one acquires knowledge that helps to understand events and actions quicker than an inexperienced observer. Personal experience represents another source of theoretical sensitivity and, by drawing on these experiences, a researcher can make comparative analyses which can generate relevant concepts of the phenomenon under observation. However, both professional and personal experience can prevent the researcher from noticing routine events.

Strauss and Corbin (1990) argue that a compromise must be sought when undertaking a grounded theory study to gain sufficient theoretical sensitivity without stifling creative ability. Furthermore, they maintain that a researcher can be so steeped in the literature that their creativity is constrained by their preconceptions or unrecognized assumptions. Inevitably, the researcher began this study with a degree of both personal and theoretical sensitivity. However, it was expected that this would enable rapid identification of the pertinent issues while remaining relatively objective by recognizing any preconceptions before the case study commenced and using the comparative analysis techniques described by Strauss and Corbin (1990) during the data analysis.

3.2 SITE SELECTION CRITERIA

The selection of an appropriate case study site for this dissertation was driven by the major objective of this dissertation which, in turn, was primarily influenced by the areas for further research suggested in Orlikowski's (1996) study upon which Orlikowski and Hofman's (1997) Improvisational Change Model was based. In order to identify the criteria for a suitable site, it was necessary to examine the organizational and technological context of the organization studied by Orlikowski (1996).

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Orlikowski (1996) suggested that further empirical research was required to determine the extent to which an improvisational perspective on change is useful in different organizational contexts. Her study concluded that research was necessary to determine how different organizational and technological conditions may influence the improvisations attempted and implemented. Consequently, an organization with a different organizational context to that studied by Orlikowski (1996), but with similar technological conditions, would be an appropriate site to determine the extent to which a contrasting organizational context may influence an improvisational perspective of IT-enabled change.

Orlikowski (1996) carried out an empirical research study over a two year period at Zeta Corporation[2]. Zeta is a software company with a Customer Service Department (CSD) which employs 53 people. The CSD has a cooperative, team-oriented culture which, using the terminology of Brynjolfsson *et al.* (1997), are typical characteristics of a network organization. A summary of the typical features of a network organization such as Zeta Corporation are shown in Table 3.1.

Network Organization
Team Oriented
Enabling Management Style
Low Vertical Integration
Direct Communication
Cross-Functional Teams
Flatter Management
Local Autonomy/Decentralized Decisions
Residual claim incentives
Expertise-based Authority

Table 3.1 - Network Organization Features (Brynjolfsson *et al.* 1997)

In 1992 the CSD introduced the Lotus Notes groupware technology with which it developed a new Incident Tracking Support System (ITSS) which was developed specifically within the Notes groupware environment. Orlikowski (1996) describes the ITSS as an example of *adaptive technology* which she defines as more open-ended, generic, and user customizable technology than traditional transaction processing computer systems. A summary of the features of Lotus Notes as an adaptive technology is given in Table 3.2.

Adaptive Technology Features	Lotus Notes
Locally Adaptable	Yes
Customizable Features	Yes
Ability to Create New Applications	Yes
Used in Different Ways Within Organization	Yes
General Purpose Tool	Yes

Table 3.2 - Adaptive Technology and Lotus Notes (adapted from Orlikowski and Hofman 1997)

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[2] The actual name of the organization was disguised.

To provide a contrasting organizational context to Zeta, an appropriate case study site would be a hierarchical organization which had integrated adaptive technology into its core business processes and which had been using this technology for approximately two years to allow any improvisational changes to develop. It was expected that a case study of a suitable organization would provide an opportunity to contribute to the improvisational perspective. It was also expected that Orlikowski and Hofman's (1997) Improvisational Change Model would provide a lens through which the organization could be studied, issues could be raised and theories could be inductively generated.

3.3 THE RADIO INTRODUCTION UNIT

The case study site chosen for this study was a Royal Air Force unit called The Radio Introduction Unit (RIU). A comprehensive discussion of the role and structure of the RIU and the technology that was introduced into this organization can be found in Appendix C. The remainder of this section will examine any assumptions concerning the organizational and technological context of the RIU.

3.3.1 Organizational Context

The RIU is an organization employing 75 people making it similar in size to Zeta Corporation. Based on the researcher's personal and professional sensitivity, and in contrast to Zeta, it was expected that the RIU would be structured as a hierarchical organization as is the norm with many military organizations. This would fulfill the organizational criterion for the selection of a suitable case study site which was identified in Section 3.2. A summary of the typical features expected from the RIU is shown in Table 3-3.

Hierarchical Organization
Individual Oriented
Controlling Management Style
High Vertical Integration
Vertical Communication
Function Based Workgroups
Multi-tiered Management
Narrow Job Descriptions
Fixed wages for output
Rank-based Authority

Table 3.3 - Hierarchical Organization Features (Brynjolfsson *et al.* 1997)

3.3.2 Technological Context

Quality Workbench is a Microsoft Windows based software package which was first introduced into the RIU in 1995 and is hosted on the corporate local area network. The RIU Configuration Manager, with direct

responsibility for the introduction of Quality Workbench, described the technology as an adaptive, flexible and general purpose workflow application which had been integrated into the core business processes of the RIU for approximately 2 years. Thus, Quality Workbench appeared to fulfill the technological requirements for the selection of a suitable case study site which were identified in Section 3.2.

3.4 SENSITIVITY BASED PRECONCEPTIONS

The researcher had a relatively high degree of personal sensitivity relating to the chosen case study site based on seventeen years experience in different Royal Air Force environments. The implications of over sensitization were discussed in Section 3.1. However, it was expected that a high degree of sensitivity would be an advantage given the relatively short period for familiarization with the culture of the case study site. Nonetheless, it was also expected that this degree of sensitivity would result in a number of preconceptions and, to minimize any resultant bias in the research, it was important that these were recognized before the case study commenced. In the remainder of this section, the researcher's preconceptions will be identified and related to the main issues derived from Orlikowski and Hofman's (1997) Improvisational Change Model in order to outline what was expected from the case study.

3.4.1 Improvisational Change Model Assumptions

Orlikowski and Hofman's (1997) Improvisational Change Model is based on the dual assumptions that IT-enabled changes are an ongoing process and that all changes cannot be anticipated in advance. These assumptions were discussed fully in Section 2.7.2. Orlikowski and Hofman (1997) maintain that there is often a discrepancy between how organizations perceive organizational change and how they implement it. Similarly, it was expected that although the introduction of Quality Workbench into the RIU would be perceived to be managed using a traditional planned approach, the enabled changes would be ongoing and not all of them would be anticipated in advance.

3.4.2 Critical Enabling Conditions

Orlikowski and Hofman (1997) suggest that certain, critical enabling conditions must be fulfilled to allow their Improvisational Change Model to be successfully adopted for implementing adaptive technology into an organization. A detailed discussion of these conditions can be found in Section 2.7.3. Briefly, the enabling conditions are the provision of dedicated resources to provide ongoing support for the change process and the alignment of the organization, technology and change model. As in many military organizations, it was expected that the RIU would employ a rigid, controlling, management style with high vertical integration, function-based workgroups and centralized decision making the RIU a hierarchical type organization.

Quality Workbench was described as highly flexible, customizable and a general purpose tool by the RIU Configuration Manager, who had direct responsibility for the introduction and maintenance of this technology

into the RIU. This suggested that the application could be categorized as an adaptive technology. Therefore, it was expected before the case study commenced that Quality Workbench would exhibit the typical features of an adaptive technology which are shown in Table 3.2.

3.4.3 Quality Workbench-Enabled Changes

The case study was expected to reveal that the introduction of an adaptive technology, such as Quality Workbench, into a hierarchical organization, such as the RIU, would not enable improvisational changes to be enacted within the organization by the manner in which these changes were discovered in Orlikowski's (1996) research. This assumption was grounded in the theoretical sensitivity of the researcher which suggested that the culture of a hierarchically organized, rigidly controlled, workplace such as the RIU would not be conducive to improvisational change. This assumption was also based on the personal perception that military organizations such as the RIU are usually steeped in tradition and as result their culture often makes them highly resistant to change.

From the foregoing discussion, it follows that although it was expected that Orlikowski and Hofman's (1997) Improvisational Change Model assumptions would hold for the RIU, the enabling conditions would not be fulfilled and therefore the case study should reveal no evidence of emergent changes or improvisations relating to the introduction of Quality Workbench. Furthermore, if there were no emergent changes or improvisations, then it was also expected there could be no evidence of any management processes or mechanisms in place to recognize the different types of ongoing change and to respond to them appropriately. Based on these preconceptions, a summary of the expectations of the case study is given in Table 3.4.

IMPROVISATIONAL PERSPECTIVE	ZETA (Theoretical Sensitivity)	RIU (Personal Sensitivity)
ASSUMPTIONS		
Change Ongoing	Yes	Yes
Not All Changes Anticipated	Yes	Yes
CRITICAL ENABLING CONDITIONS		
Key Dimensions		
Change Model	Improvisational	Planned
Organization	Networked	Hierarchical
Technology	Adaptive	Adaptive
On-Going Change Support		
Identification Mechanism	Yes	No
Response Mechanism	Yes	No
TYPES OF CHANGE		
Anticipated	Yes	Yes
Emergent	Yes	No
Opportunity-Based	Yes	Yes

Table 3.4 - Case Study Expectations

3.5 SUMMARY

A grounded theory research method was adopted for this dissertation as it was anticipated that data could be inductively derived from a suitable case study to determine if Orlikowski and Hofman's (1997) Improvisational Change Model is a relevant model for explaining the process of IT-enabled change in a different organizational context to that of the original study. Sensitivity is an important issue relating to the grounded theory research method. Sensitivity, which emanates from personal and professional experience and from exposure to relevant technical literature, can help a researcher to understand events and actions relatively quickly. However, an over sensitized researcher can be too subjective and it is important to recognize any preconceptions in order to minimize any possible bias in the research.

The organization studied by Orlikowski (1996) and Orlikowski and Hofman's (1997) was a network type organization which introduced an adaptive technology. Therefore, to fulfill the objectives of this dissertation a hierarchical organization which had introduced an adaptive technology would constitute an appropriate site to determine the extent to which an improvisational perspective is useful in a contrasting organizational context.

It was expected that Orlikowski and Hofman's (1997) Improvisational Change Model assumptions would hold for the RIU but the key dimensional enabling conditions would not be fulfilled. Therefore, the case study should reveal no evidence of emergent changes or improvisations relating to the introduction of Quality Workbench. Also, if there were no emergent changes or improvisations it was also expected there could be no evidence of any management processes or mechanisms in place to recognize and respond to the different types of ongoing change appropriately.

Chapter 4

DATA COLLECTION AND INITIAL ANALYSIS

INTRODUCTION

The case study for this dissertation focused on the effects of introducing an apparently adaptive technology called Quality Workbench into the core business processes of a Royal Air Force unit called the RIU. A detailed description of the RIU and Quality Workbench is given in Appendix C. The aim of this chapter is to examine the data collection and analysis methods which were used during the case study and to discuss the interpretations of these data. The case study assumptions were discussed in Chapter 3; an evaluation of the disparity between these assumptions and the data interpretations in this chapter will be given in Chapter 5. It is important to understand that although data collection and analysis are presented sequentially in this chapter, in practice these phases were carried out iteratively using a grounded theory approach.

This chapter will begin with an explanation of why each particular data collection method was used and how data was specifically collected from the RIU using each method. The chapter will then discuss the initial analysis of the data to determine how the introduction of Quality Workbench into the RIU relates to the assumptions and critical enabling conditions of Orlikowski and Hofman's (1997) Improvisational Change Model. Finally, the chapter will examine the data to identify and categorize any Quality Workbench-enabled changes to the structure, processes and culture of the RIU.

4.1 DATA COLLECTION TECHNIQUES

Data collection at the RIU was conducted by a single researcher over a two week period and involved the use of document reviews, a questionnaire, semi-structured interviews and observation. It was necessary to identify a sample population from the 75 RIU personnel that would permit the collection of data within the limited project time constraint and would also minimize any possible bias. The chosen population spanned all vertical levels and functional groupings and included: the Chief Executive Officer, senior management, project managers, technical authors, IT specialists, Quality Assurance specialists and administration staff.

Table 4.1 shows a breakdown of data collection methods by employee level and function. The data collection methods will be summarized in the remainder of this section.

Function/Level	Questionnaires	Interviews	Observations
CEO	1	1	1
Senior Managers	2	2	2
Project Managers	10	10	4
Tech Authors	5	5	2
IT Specialists	1	1	1
QA Specialists	1	1	2
Admin Staff	1	1	2
Totals	**21**	**21**	**14**

Table 4.1 - Data Collection Method by Function/Level

4.1.1 Document Review

The data collection phase of the study began with a general examination of all relevant documentation to provide the researcher with sufficient theoretical sensitivity concerning the role and structure of the RIU and the rationale and functionality of the Quality Workbench application. A summary of this data is included in Appendix C.

It is part of the corporate culture of the Royal Air Force that a relatively high turnover of staff necessitates good documentation to provide continuity and, therefore, a review of the administration files relevant to the area of study was carried out. This source of data was expected to yield useful information regarding the chronology of events and the historical purpose regarding the introduction of Quality Workbench into the RIU. Specifically, a review of the administration files was undertaken to obtain evidence to verify the original purpose for implementing Quality Workbench. The intention was to relate any documentary evidence to the three types of change identified by Orlikowski and Hofman (1997),summarized in Section 2.7.1, in order to ascertain which organizational changes were originally anticipated by the RIU management. The administration files yielded a summary of the historical events leading to the implementation of Quality Workbench which is shown in Table C.2 of Appendix C.

4.1.2 Questionnaire

A questionnaire was used early in the case study to elicit data from the sample RIU population. The questionnaire was designed using the principles suggested by Leedy (1993) to ensure that the questions were unambiguous and that it fulfilled a specific purpose. A covering letter was sent with the questionnaire to explain the confidentiality and purpose of the study to ensure that any information given was accurate and

not politically motivated. The primary purpose of the questionnaire was to identify those RIU personnel that had been in the organization before the introduction of Quality Workbench and thus could comment on the process and structural changes that may have occurred based on first-hand knowledge rather than hearsay. Also, the questionnaire was intended to indicate those functional areas and levels or key employees within the organization that had been most affected by the new technology which would allow the research to target those areas or employees. Glaser and Strauss (1967) maintain that groups should be chosen as the development of theory directs, therefore, this approach is consistent with the grounded theory approach. The questionnaire also indicated the willingness of the participants to be involved in the study and the quality of information that they could contribute. Twenty questionnaires were distributed and returned using the RIU's electronic mail system and all of the questionnaires were returned completed before the required deadline. An extra questionnaire was returned voluntarily by an employee who was added to the sample population. The covering letter and questionnaire are shown in Appendix D.

4.1.3 Semi-Structured Interviews and Informal Discussions

Semi-structured interviews were conducted in order to gather more specific information on the concepts that emerged from both the document review and the analysis of the questionnaire data which was completed early in the case study. Semi-structured interviews were considered appropriate to the grounded theory approach as they allowed the interviews to be more generative, however, during the later stages of the research the interviews became more structured as the theoretical concepts were verified. Twenty one interviews were conducted in total, each one lasting approximately forty five minutes and involving the sample RIU population. Specifically, the interviews were designed to focus on the organizational context, technology, change process, anticipated, emergent and opportunity-based changes and generally to identify the common themes concerning any IT-enabled organizational changes. The interviews were also used to determine the frequency and duration of Quality Workbench use to enable a weighting to be given to the data during analysis.

Informal discussions were also carried out with the technical director and software developers from Ideagen, the company which develops Quality Workbench. The purpose of this was to determine the extent of the software change requests that had been instigated by the RIU and integrated into the latest versions of Quality Workbench. It was envisaged that this would reveal evidence of any emergent or opportunity-based changes that had become part of the formal configuration of the technology.

4.1.4 Observation

The working practices of the sample RIU population were observed first hand using a participative approach. This was considered to be the most efficient data collection method as some employees only used Quality Workbench relatively infrequently. The data obtained from observation differed fundamentally from the other data collection methods as it was collected first-hand rather than retrospective data obtained from document reviews or interviews. The purpose of these observations were to verify that the technology was being used

in the formal manner intended and to see if any informal changes to working practices had emerged through local adaptations or improvisations.

4.2 INITIAL DATA ANALYSIS

An iterative approach to data collection and initial analysis was used which focused on the phenomenon of IT-enabled organizational change within the RIU. To enable a contextual evaluation of any organizational changes to be made, initial data collection and analysis directed the research towards comparing the RIU's experiences with the main issues raised by Orlikowski and Hofman's (1997) Improvisational Change Model. Specifically, these issues are: the assumptions upon which the model is based, the enabling conditions that allow an improvisational model to be adopted and the identification and classification of any Quality Workbench-enabled changes. The remainder of this section will examine each of these issues.

4.2.1 Improvisational Change Model Assumptions

The assumptions upon which the Improvisational Change Model is based are that IT-enabled changes are an ongoing process and that all changes cannot be anticipated in advance. At the RIU, anecdotal and documentary data revealed that Quality Workbench-enabled changes to the unit's processes, culture and technology were an ongoing process which started with the implementation of the technology in March 1995 and were still occurring. Moreover, the case study itself raised a number of important issues which it is envisaged will lead to further changes to the unit's structure, processes and technology in future. The case study also revealed that the Quality Workbench-enabled organizational changes were not all anticipated in advance and that a number of opportunity-based and emergent changes were implemented. These changes will be discussed fully in Section 4.2.3.

4.2.2 Critical Enabling Conditions

Aligning key dimensions of the change process and dedicating resources to provide ongoing support for the change process were the critical enabling conditions identified by Orlikowski and Hofman (1997) which they maintain must be fulfilled to enable their Improvisational Change Model to be successfully adopted. They also maintain that interdependent relationships exist between an organization's context, technology and the change management model and that these must be aligned, or at least not in opposition. Initial data collection and analysis was, therefore, directed towards examining these key change dimensions within the context of the RIU and the introduction of Quality Workbench.

Data obtained from documents and interviews revealed that the RIU management uses a controlling management style with high vertical integration, function-based workgroups and centralized decision making. A comparison of the features of a typical hierarchical organization (Brynjolfsson *et al.* 1997) and the RIU is shown in Table 4.2 which indicates that the RIU is a hierarchical organization.

Hierarchical Organization Features	RIU Organization
Individual Oriented	Yes
Controlling Management Style	Yes
High Vertical Integration	Yes
Vertical Communication	Yes
Function Based Workgroups	Yes
Multi-tiered Management	Yes
Narrow Job Descriptions	No
Fixed wages for output	Yes
Rank-based Authority	Yes

Table 4.2 - Hierarchical Organization And The RIU

Although Quality Workbench had been described by the RIU Configuration manager as an adaptable technology, examination of the User Manual, the RIU Quality Management System Work Instructions and a consultant's report (Burr 1994) revealed that Quality Workbench does not fulfill the criteria for adaptive technology. Orlikowski and Hofman (1997) define adaptive technology as technology which is locally adaptable by end users with customizable features and with the ability to create new applications. They maintain that adaptable technology is typically used in different ways across an organization which was not the case with Quality Workbench. A comparison of the features of adaptive technology and Quality Workbench are shown in Table 4.3 which indicates that Quality Workbench is a non-adaptive technology.

Adaptive Technology Features	Quality Workbench
Locally Adaptable	No
Customizable Features	No
Ability to Create New Applications	No
Used in Different Ways Within Organization	No
General Purpose Tool	No

Table 4.3 - Adaptive Technology And Quality Workbench

It was difficult to determine the type of change management model which had been adopted during the implementation of Quality Workbench within the RIU. A document review revealed corporate files containing a project plan based upon a typical Lewinian (unfreeze-change-freeze), planned approach to change management. However, although this was the plan, semi-structured interviews revealed that in practice it was agreed among senior management that the successful implementation of Quality Workbench required a degree of ongoing adaptations as the organization learned to use the workflow capabilities of the application. Furthermore, administration files and interviews revealed that, as a major customer of Ideagen (the Quality Workbench developers), the RIU management realized that it had very strong influence which was used to effect changes to the functionality of Quality Workbench thus formalizing their organizational adaptations. Therefore, the data indicates that an improvisational management model was adopted by the RIU based initially upon a planned approach which in practice evolved into an improvisational approach at the organizational level.

Orlikowski and Hofman (1997) argue that using an improvisational model for managing technological change requires ongoing-support in the form of a set of processes and mechanisms to recognize the anticipated, opportunity-based and emergent changes as they occur and to respond effectively to them. Initial data analysis indicated that the RIU had provided on-going support for changes enabled by the introduction of Quality Workbench. The data revealed that the RIU management had identified an early requirement for ongoing support for their quality management system which included Quality Workbench. The data also showed that a Quality Management System (QMS) Configuration Manager was established to provide ongoing support. Analysis of the terms of reference for the QMS Configuration Manager showed that his responsibilities included the adaptation and configuration of Quality Workbench. Administration files verified that the QMS Configuration Manager had provided ongoing support for Quality Workbench. For example, the QMS Configuration Manager had conveyed RIU software change requests to Ideagen for implementation in later Quality Workbench versions. The Configuration Manager had then adapted the organization to these opportunity-based changes by reviewing the working practices of the RIU and formalizing the resultant changes.

4.2.3 Quality Workbench-Enabled Changes

In order to consider Orlikowski and Hofman's (1997) Improvisational Change Model in the context of the RIU, data was collected to establish if the introduction of Quality Workbench had enabled changes to the structure, processes, culture and technology of the organization and if so to categorize each change as either anticipated, opportunity-based or emergent. All data collection techniques were used for this and a summary of the Quality Workbench-enabled changes is shown in Table 4.4.

The initial data analysis revealed that Quality Workbench had not enabled any structural changes to be made to the hierarchical organization of the RIU. However, a number of changes to the organizational practices, culture and technology were identified and categorized.

As expected, anticipated changes occurred to the RIU's processes and culture, however, two anticipated changes did not occur. The first was to migrate the organization to a paperless office concept; there was considerable hard-copy documentary evidence to prove that this had not been achieved. Also, it was anticipated that Quality Workbench would help to achieve organizational cohesion through a unified document configuration system, however, the questionnaire and subsequent interviews revealed that one department in particular exhibited signs of relative autonomy within the organization.

The data also indicated that the identified opportunity-based changes occurred to the RIU in response to the organization deliberately taking advantage of the unexpected functionality of Quality Workbench. The potential for the process changes was generally recognized by the implementation team early in the project the exception being the use of a contract document database as a source of corporate information. The changes made to the technology itself were generally driven by user software change requests to address

perceived unsatisfactory features after initial implementation and a number of these changes were ongoing at the time of the case study.

A number of changes were identified and categorized as emergent changes when the initial analysis indicated that these changes arose spontaneously from local innovations. These emergent changes will be explained in detail in Section 5.2.3.

QWB-ENABLED CHANGES	TYPE	COMMENT
STRUCTURE		
None		
PRACTICES		
Automated Workflow	Anticipated	
Document Configuration Control	Anticipated	
Paperless Office	Anticipated	Not Achieved - Hard Copies of QMS Procedures Used Throughout
Electronic Document Viewing	Anticipated	
Quality Audit Scheduling	Anticipated	
Audit Non-Conformity Tracking	Opportunity	
Customer Database	Opportunity	
Customer Complaints System	Opportunity	
Task Knowledgebase	Opportunity	Basic knowledge-base
Task Knowledgebase	Emergent	Initial Orientation
Proxy Document Authorization	Emergent	Informal System Use
Document Check Out	Emergent	Informal System Use
Manually Amended Documents	Emergent	Informal System Use
CULTURAL		
Departmental Cohesion	Anticipated	Not Achieved - TRP Semi-autonomous
'Right First Time' Attitude	Anticipated	"Fire and Forget" Documents
TECHNOLOGY		
Changes Made		
Multiple Databases	Opportunity	TRP driven
Menu Terminology	Opportunity	Configuration Manager Driven
Proxy Document Authorization	Emergent	Legitimized Informal System Use
Document Check Out	Emergent	Legitimized Informal System Use
Changes In Progress		
Macro Facility	Opportunity	
Hyperlinking Documents	Opportunity	
Free-Text Document Search	Opportunity	

Table 4.4 - Quality Workbench-Enabled Changes

4.3 SUMMARY

The data collection methods used during the case study were document reviews, a questionnaire, semi-structured interviews, informal interviews and participative observation. A sample population that spanned all vertical levels and functional groupings of the RIU was identified to enable data collection within the time constraint of the project and also to minimize any possible bias in the data.

IT-Enabled Change: A Contextual Evaluation Of An Improvisational Perspective

An iterative approach to data collection and initial analysis was used which focused on the phenomenon of IT-enabled organizational change within the RIU. To enable a contextual evaluation of any organizational changes to be made, initial data collection and analysis directed the research towards comparing the organization's experiences with the main issues raised by Orlikowski and Hofman's (1997) Improvisational Change Model (1997). Specifically, these issues were: the assumptions upon which the model was based, the enabling conditions that allow an improvisational model to be adopted and the identification and classification of any Quality Workbench-enabled changes.

An initial data analysis revealed that Quality Workbench-enabled changes to the unit's processes, culture and technology were an ongoing process and that the Quality Workbench-enabled organizational changes were not all anticipated in advance as a number of opportunity-based and emergent changes had occurred. A comparison of the RIU with the typical features of a hierarchical organization confirmed the assumption that the RIU is organized hierarchically. However, a comparison of Quality Workbench with the typical features of an adaptive technology showed that this workflow application is non-adaptive contrary to the initial assumptions.

A number of Quality Workbench-enabled changes were identified and categorized during the initial analysis. Remarkably, the case study revealed no evidence of any structural changes to the organization of the RIU, however, a number of changes to the RIU's processes, culture and to the technology itself were identified and categorized. As expected, there was evidence of both anticipated and opportunity-based changes, however, the initial analysis also revealed that a number of emergent changes occurred to the RIU's processes contrary to the assumptions made before the case study commenced.

Chapter 5

DATA ANALYSIS AND INTERPRETATION

INTRODUCTION

A theoretical model is merely a lens through which a particular phenomenon can be viewed and issues can be raised; it provides an abstraction of reality with which a phenomenon can be explained. A number of important issues were raised during the case study using Orlikowski and Hofman's (1997) Improvisational Change Model as the lens through which the phenomenon of IT-enabled change at the RIU was viewed. These issues were particularly significant when there was a disparity between what was expected to happen and what actually did happen to the RIU following the introduction of Quality Workbench.

This chapter will discuss the findings resulting from the analysis and interpretation of the case study data. In particular, it will focus on the issues raised when the case study expectations and assumptions were not supported by the findings. The chapter will begin by examining the implications of the unanticipated differences between the RIU's organizational and technological context and the critical enabling conditions of Orlikowski and Hofman's (1997) Improvisational Change Model. The chapter will then examine the reasons for the unexpected anticipated, opportunity-based and emergent changes that occurred to the practices, culture and technology of the RIU following the introduction of Quality Workbench.

5.1 CRITICAL ENABLING CONDITIONS

Although Quality Workbench had been described by the RIU Configuration Manager as an adaptable technology, the findings revealed that Quality Workbench was a non-adaptive technology as defined by Orlikowski and Hofman (1997). This disparity can be explained by considering the different stakeholder perspectives of the RIU Configuration Manager and a typical Quality Workbench user within the organization. The Configuration Manager had a significantly higher level of system access than any user and, from this global perspective, the application could be adapted significantly more than a user's access privileges permitted. Furthermore, the Configuration Manager had a great deal of influence on how the

system was used by the organization and the Configuration Manager incorrectly perceived organizational adaptation to be synonymous with technological adaptation. The implication of this discovery was that the objective of this dissertation was modified from considering Orlikowski and Hofman's (1997) Improvisational Change Model in a different organizational context to considering the model in both a different organizational context and a different technological context from that of the original study.

It was expected that, for the introduction of Quality Workbench, the RIU would have adopted a conventional change management model based upon the planned approach which was discussed in Section 2.3. However, the findings revealed that in practice an improvisational management model was adopted by the RIU. Their change management strategy was based initially upon a perceived planned approach (unfreeze-change-freeze) which evolved into an improvisational approach at the organizational level. This was similar to the phenomenon identified by Argyris and Schon (1978) who pointed out the inconsistency between espoused theories and practical theories in use. Simply stated, the RIU management perceived that they were following a planned change model while in reality the model was unavoidably improvisational to deal with unanticipated and ongoing IT-enabled changes that emerged.

The case study findings also revealed that the key change dimensions of the RIU, shown in Figure 5.1, were not aligned and, therefore, not conducive to the successfully adoption of an improvisational change model. Consequently, the case study was not expected to reveal evidence of any ongoing support in the form of management processes or mechanisms which recognized the different types of Quality Workbench-enabled changes and responded to them appropriately.
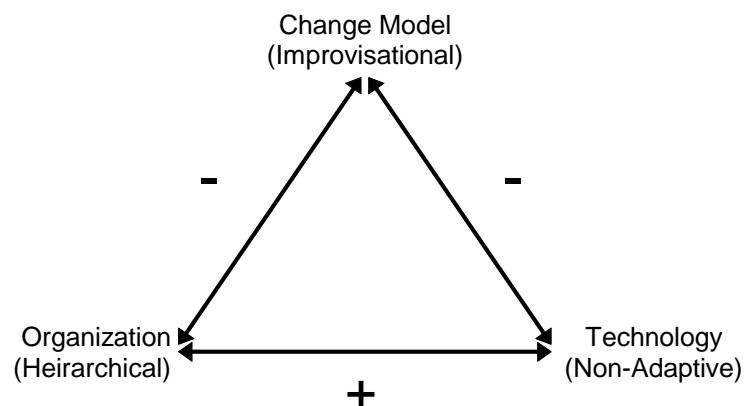
Figure 5.1 - RIU Key Change Dimensions (adapted from Orlikowski and Hofman 1997, pp.18)

However, contrary to expectations, the case study revealed that the RIU management had identified an early requirement for ongoing support for the introduction and ongoing adaptation of Quality Workbench and, consequently, a Configuration Manager was established within the organization. This function was undertaken by an existing member of the RIU and as a result no structural change occurred. Orlikowski and Hofman (1997) contend that ongoing support is a critical condition for enabling the adoption of an

improvisational change model. Their contention was corroborated by the RIU case study as the data analysis indicated that, without the ongoing support provided by the Configuration Manager, neither opportunity-based nor emergent changes could have been formally implemented due to the non-adaptive nature of the technology at the local level.

5.2 QUALITY WORKBENCH-ENABLED CHANGES

It was expected that a number IT-enabled changes would have occurred to the structure of the RIU following the introduction of Quality Workbench. However, although the workflow capability of Quality Workbench had *enabled* structural changes to be made to the hierarchical organization of the RIU, the management had deliberately not *created* any changes. The case study findings indicated that Quality Workbench was procured for a specific purpose to fit into the existing organizational structure and, therefore, Quality Workbench-enabled structural changes were considered undesirable. This policy was rationalized by one senior manager who stated:

> *"… its never a good idea to procure commercial off the shelf software that requires organizational changes to be made"*

The case study findings indicated that, the RIU management had determined that the perceived adaptability of Quality Workbench would allow the technology to be adapted to fit the existing structure of the organization and, therefore, a deliberate resistance-to-change policy was adopted regarding the organizational structure.

The remainder of this section will discuss the changes that were identified during the case study. These changes have been classified according to Orlikowski and Hofman's (1997) definitions for the different types of change which were discussed in Section 2.7.1

5.2.1 Anticipated Changes

Numerous Quality Workbench-enabled anticipated changes occurred to the working practices, or processes, of the RIU which were subsequently implemented. One anticipated change which did not occur was the 'paperless office' concept. Quality Workbench did not permit multiple documents to be accessed concurrently which is a frequent user requirement; also many users found it difficult to absorb information when reading documents on-screen. Consequently, hard copies of documents were often printed and a process-change solution was instigated to avoid document configuration problems by ensuring that all printed documents had a footer appended automatically by Quality Workbench stating that the document was valid for only seven days.

Another anticipated change was also not realized. It was expected that a cultural change would occur to improve organizational cohesion following the implementation of Quality Workbench and the resultant unification of working practices. However, one department in particular perceived that Quality Workbench had produced an adverse effect on the cohesion of the organization. The case study findings indicated that the core business practices of the dissatisfied department were dependent on Quality Workbench more than any other department and, therefore, the shortcomings of the technology were much more significant to that department.

5.2.2 Opportunity-Based Changes

A number of opportunity-based changes occurred to the working practices, or processes, of the RIU which were identified during the case study. The Quality Workbench database facility was used for archiving all documents released in support of each contract. As the documents are often similar, it was soon realized that this database could be used to provide a basic corporate knowledge-base to avoid 'reinventing the wheel' for each contract.

The case study revealed a number of opportunity-based changes to the technology that were initiated by Quality Workbench users to address new requirements. A major impediment when accessing the corporate knowledge-base was that Quality Workbench did not provide a free-text search facility on the archived documents. A basic keyword search facility was available, however, this relied on the document author manually selecting and appending keywords to each document. Users identified a requirement for: a free-text search tool, a macro facility to automate complicated keystroke sequences and a hyperlinking facility between database documents. The RIU Configuration Manager initiated software change requests to address these shortcomings and these opportunity-based changes will become a formal feature of the technology with the next version of Quality Workbench.

5.2.3 Emergent Changes

It was expected that the case study would reveal no evidence of emergent changes or improvisations. However, contrary to expectations, the findings revealed that a number of changes did occur that were not planned or anticipated when Quality Workbench was introduced. Furthermore, these changes occurred tacitly over time and arose spontaneously from local innovations. Using Orlikowsk and Hofman's (1997) definitions, these changes were categorized as emergent Quality Workbench-enabled changes.

The case study disclosed one local improvisation. It was revealed that the corporate knowledge-base was used informally by new employees to acquire an initial feel for the required documentation standards and also to provide templates for new contract documentation. Although there was no collusion on this matter, each department had spontaneously adopted this as an informal working practice.

The case study findings also revealed two improvisational changes which emerged from local, informal adaptations to the working practices of the RIU. Quality Workbench was intended to be used for active document configuration and users were required to edit documents within the application. However, the limitations of the technology compelled many users to unofficially edit documents outside the application and only to submit them when the amendments were completed. It was also intended that document approval and authority for release would be granted using the workflow capability of Quality Workbench, however, the study revealed that many users would authorize their own documents using proxy authorization, granted unofficially by their superiors, to circumvent the authorization procedures. These emergent, procedural changes had all resulted from initial user dissatisfaction with the technology; as one senior manager observed:

> *"..when Quality Workbench was first introduced the initial problems were so bad that the current problems are considered acceptable "*

Orlikowski (1996) showed that many of the improvisations in her study were initiated by the initial, unsatisfactory features of the technology. For example, the customer service advisors improvised and adapted their procedures and instigated a manual method call logging when the system showed initial signs of unreliability (Orlikowski 1996, pp73). The findings from this research showed that a similar relationship exists. For example, when the response of the Quality Workbench system was unacceptably slow, users improvised and an informal process emerged whereby documents were 'checked out' of the configuration control system to be amended outside the application.

The case study revealed that the local, improvisational changes that emerged over time were later legitimized as organizational-wide changes through a formal software change request process. These emergent changes will become a formal feature of the technology with the next version of Quality Workbench.

5.3 SUMMARY

A number of issues were raised during the case study which were particularly significant when the case study expectations and assumptions were not supported by the findings. Contrary to expectations, the findings revealed that Quality Workbench was a non-adaptive technology and the objective of this dissertation was modified to evaluating Orlikowski and Hofman's (1997) Improvisational Change Model in both a different organizational context and a different technological context from that of the original study.

The findings also revealed that the RIU management perceived that they were following a planned change model while in reality the model was unavoidably improvisational to deal with unanticipated and ongoing IT-enabled changes that emerged. The case study also revealed that the RIU had unexpectedly provided

ongoing support for change without which neither opportunity-based nor emergent changes could have been formally implemented due to the non-adaptive nature of the technology at the local level.

Although the workflow capability of Quality Workbench had enabled structural changes to be made to the hierarchical organization of the RIU, a deliberate resistance-to-change policy was adopted as the RIU management had determined that the perceived adaptability of Quality Workbench would allow the technology to be adapted to fit the existing structure of the organization.

Numerous Quality Workbench-enabled, anticipated changes and opportunity-based changes occurred to the working practices, or processes, of the RIU. Contrary to expectations, the findings also disclosed one local improvisation and two improvisational changes which emerged from local, informal, adaptations to the working practices of the RIU and which later became formal changes to the technology. The opportunity-based changes to the technology and the informal emergent changes to the processes both resulted in a number of software change requests which were initiated to address the perceived shortcomings of Quality Workbench. The emergent changes all resulted from user dissatisfaction with the technology and they will become a formal feature of the technology with the next version of Quality Workbench.

Chapter 6

CONCLUSIONS

INTRODUCTION

This chapter will discuss the conclusions of this dissertation which focused on a contextual evaluation of an improvisational perspective of IT-enabled change. The issues identified in this research are clearly specific to one organization, however, the conclusions presented in this chapter are grounded in the theory postulated by Orlikowski and Hofman's (1997) Improvisational Change Model which gives a generalized perspective of an improvisational change process. This generalized perspective is extended by this research with insights from a review of the existing formal theory and with interpretations from a contextual case study. The chapter will begin by examining the research findings which were supported by the case study data. The chapter will then summarize what has been achieved by relating the findings of the research to the objectives which were discussed in the first chapter.

6.1 RESEARCH FINDINGS

Orlikowski and Hofman's (1997) Improvisational Change Model provides an improvisational perspective on change based on a specific organizational and technological context. This model was used as a lens through which an organization with a contrasting organizational and technological context was viewed. A number of issues emerged from the grounded theory study which, although they may be specific to the organization in question, contributes to the general understanding of the improvisational perspective on IT-enabled change. The remainder of this section will examine the conclusions of this dissertation which are derived from the case study data.

6.1.1 Hierarchical Organizations And Ongoing Improvisations

Orlikowski and Hofman (1997) contend that their Improvisational Change Model is a suitable lens for network organizations and that it may not be suitable for cultures that do not support experimentation and

learning; these are features that are typically found in more rigid, hierarchical organizations. This study focused on a hierarchical organization in order to evaluate the improvisational perspective in a contrasting organizational context.

This research did not reveal evidence of any IT-enabled structural changes and it is concluded that this was due to the inherent culture of the rigid, hierarchical organization and a deliberate policy of resistance to change. However, the findings did reveal that a hierarchical organization was conducive to local improvisations which resulted in emergent process changes in the form of informal systems usage. These informal practices were later formalized and integrated into the organizational processes and the technology itself was adapted as a result. The local improvisations which emerged could not be formally implemented as the technology was non-adaptive, nevertheless, the changes were enacted through the provision of ongoing support which adapted both the organization and the technology. This research concludes that improvisational changes can occur in hierarchical organizations and that these changes can be implemented successfully using an improvisational perspective provided that ongoing support is available.

6.1.2 User Dissatisfaction And Local Improvisations

The case study revealed that the emergent process changes, which were eventually formalized as technological changes, had all resulted from initial user dissatisfaction with the technology. The culture of the hierarchical organization discouraged informal uses of the technology, even to the extent of documenting operating procedures in detail. However, local improvisations still occurred to circumvent the initial technological deficiencies. The findings revealed that these improvisational changes occurred because the level of user dissatisfaction was greater than the cultural influence of the hierarchical organization. Therefore, this research concludes that there is a correlation between the level of user dissatisfaction and the emergence of any local improvisations regardless of the organization type.

6.1.3 Non-Adaptive Technology And Local Improvisations

Orlikowski and Hofman (1997) maintain that their Improvisational Change Model is most appropriate for open-ended, customizable technologies. In order to evaluate the improvisational perspective in an contrasting technological context, this study focused on an organization that had introduced non-adaptive technology. The findings revealed that local improvisations to the processes did occur to compensate for the unsatisfactory features of the technology. Although the non-adaptive nature of the technology prevented these local improvisations from being formally implemented, they later became formal, organizational-wide improvisations which were integrated into the processes and technology of the organization. This research concludes that local improvisations can occur in organizations that adopt non-adaptive IT although the technology cannot be adapted to formally implement the emergent changes. However, the improvisations can enable organizational-wide changes to be implemented when ongoing support for change management is forthcoming.

6.1.4 Orlikowski and Hofman's Improvisational Perspective In Context

Orlikowski and Hofman (1997) maintain that change is typically an ongoing process comprising opportunities and challenges that are not all anticipated at the start in contrast to traditional, Lewinian models of technical change. Orlikowski and Hofman (1997) also contend that a significant factor contributing to the difficulties of managing IT-enabled change is the discrepancy between the way people perceive technical change and the way that they actually implement it. The findings of this research agree with these assertions. The case study revealed that unanticipated improvisations occurred in a hierarchical organization and also that ongoing support was essential for the change process. Furthermore, although the organization's management perceived that it had adopted a traditional change model, it had in fact adopted an improvisational approach to implement the improvisations that emerged.

To enable an organization to effectively adopt an improvisational change model, Orlikowski and Hofman (1997) contend that certain critical enabling conditions must be satisfied. These conditions are discussed in Section 2.7.2. The findings of this research showed that these critical enabling conditions were not satisfied by the case study organization. Ongoing support for the change process was provided, however, the key change dimensions of the organization were actually in opposition as shown in Figure 5-1. Nevertheless, the findings revealed that a number of local improvisations did occur. Also, although the organization perceived that it was using a planned change model, in practice the change management model that it did use was unavoidably improvisational to deal with the unanticipated and ongoing IT-enabled changes which emerged. This suggests that an improvisational perspective may be useful for hierarchical organizations which introduce new technology as the local improvisations which can occur could be leveraged for advantage.

6.2 SUMMARY

The objective of this research was to build upon Orlikowski and Hofman's (1997) Improvisational Change Model by evaluating the model in a different organizational and technological context to that of the original study. This was achieved with a review of the change management literature and an empirical study of a hierarchical organization's experience with the adoption and use of non-adaptive information technology. Orlikowski and Hofman's (1997) Improvisational Change Model has been extended by this research with insights from a review of the existing formal theory and with interpretations from a contextual case study which contribute to the general understanding of the improvisational perspective of IT-enabled change.

A review of the literature was undertaken to sensitize the researcher to the change management issues from both the social sciences and the information systems research perspectives. The review revealed that the dominant theories and models relating to the management of change have evolved from the social sciences and most IS theories and models have evolved from these. The literature review also revealed the core

research papers by Orlikowski (1996) and Orlikowski and Hofman (1997) and the Improvisational Change Model upon which this dissertation has been grounded. A grounded theory approach was used for this dissertation to build upon Orlikowski and Hofman's (1997) Improvisational Change Model. Orlikowski and Hofman (1997) studied a network type organization which introduced an adaptive technology, therefore, to undertake a contextual evaluation of their improvisational perspective a hierarchical organization which had introduced a non-adaptive technology was chosen for the case study.

This research concludes that improvisational changes can occur in hierarchical organizations and that these changes can be implemented successfully using an improvisational perspective provided that ongoing support is available. Also, local improvisations can occur in organizations that adopt non-adaptive IT although the technology cannot be adapted to formally implement them. However, the improvisations can enable organizational-wide changes to be created when ongoing support for change management is forthcoming. The findings also suggest that there is a correlation between the level of customer dissatisfaction and the emergence of any local improvisations regardless of the organization type.

The findings of this study agree with Orlikowski and Hofman's assertions that change is typically an ongoing process and that a significant factor contributing to the difficulties of managing IT-enabled change is the discrepancy between the way people perceive technical change and the way that they actually implement it. The findings also suggest that an improvisational perspective may be useful for hierarchical organizations which introduce new technology as the local improvisations which can occur could be leveraged for advantage.

Orlikowski and Hofman (1997) suggest that their alternative Improvisational Change Model may only enable organizations to take advantage of the enabling capabilities, emerging practices and unanticipated outcomes associated with the use of new technologies. There has been limited research into the potential benefits of adopting an improvisational perspective of IT-enabled change and this is clearly an area worthy of further research which would inform both the social and computer sciences. This issue may become more pertinent as the ability to manage change successfully is likely to become a key competitive strength of all organizations regardless of their organizational or technological contexts. This research suggests that adopting an improvisational perspective of change management may have a wider application then originally envisaged.

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Appendix A

PROJECT EVALUATION

A.1 PROJECT OVERVIEW

This project was undertaken as part of a Master of Science course in Information Systems between January and September 1996. The project was completed in three main phases and a project plan was developed to maintain control of the project activities and to provide opportunities for feedback at appropriate milestones. The main phases of the project were: survey and initial planning, further planning and review and execution of plan and reporting.

The survey and initial planning phase took place between Janurary and mid April 1996 and involved an initial investigation of the problem area, tentatively setting the project objectives and planning the work to be done. The deliverables for this phase included a draft of Chapter 1, a preliminary bibliography and an initial project plan for the remaining work. The initial plan identified the phases, deliverables and milestones of the project; these initial estimations can be compared with both the actual activity durations, shown in Table A-1, and the actual deliverable dates shown in Table A-2.

ACTIVITY	ESTIMATED DATES	ESTIMATED DAYS	ACTUAL DATES	ACTUAL DAYS
Project Plan	5 Mar - 14 Apr	41	5 Mar - 14 Apr	41
Easter Vacation	22 Mar - 6 Apr	16	22 Mar - 6 Apr	16
Literature Review	15 Apr - 23 May	39	**15 Apr - 15 Jun**	**62**
Prepare Presentation	1 May - 5 May	5	**4 May - 5 May**	**2**
Exam Revision	24 May - 1 Jun	9	24 May - 1 Jun	9
Exams	2 Jun - 13 Jun	12	2 Jun - 13 Jun	12
Investigate Research Method	16 Jun - 22 Jun	7	**18 Jun - 29 Jun**	**12**
Case Study Preparation	23 Jun - 29 Jun	7	**NIL**	**0**
Case Study	30 Jun - 11 Jul	12	30 Jun - 11 Jul	12
Case Study Analysis	12 Jul - 20 Jul	9	**12 Jul - 9 Aug**	**30**
Evaluation and Interpretation	21 Jul - 8 Aug	19	**17 Aug - 2 Sep**	**17**
Summer Vacation	9 Aug - 16 Aug	8	9 Aug - 16 Aug	8
Conclusions	17 Aug - 7 Sep	22	**3 Sep - 21 Sep**	**19**
Proof Read & Print	8 Sep - 15 Sep	8	**22 Sep - 24 Sep**	**3**

Table A.5 - Estimated And Actual Activity Duration

DELIVERABLES	ESTIMATED DATES	ACTUAL DATES
Project Plan	14 April 1997	14 April 1997
Draft Chapter 1	14 April 1997	14 April 1997
Preliminary Bibliography	14 April 1997	14 April 1997
Progress Review Report	5 May 1997	5 May 1997
Presentation	5 May 1997	5 May 1997
Draft Chapter 2	23 May 1997	**16 June 1997**
Draft Chapter 3	22 June 1997	**30 July 1997**
Draft Chapter4	20 July 1997	**16 August 1997**
Draft Chapter 5	8 August 1997	**3 September 1997**
Draft Chapter 6	7 September 1997	**17 September 1997**
Dissertation	15 September 1997	**24 September 1997**

Table A.2 - Estimated And Actual Deliverable Dates

The plan was reviewed continually throughout the project and revised timescales and deliverables were agreed with the project supervisor at regular progress meetings. Tables A.1 and A.2 show that there was little variation between the activities identified initially and the actual activities undertaken. The dates in bold indicate when the estimates were not met. The tables also show that the initial project estimates were revised to reflect the increase in the time taken to complete the literature review and the case study analysis in particular.

In practice, the literature review took longer to complete because it was difficult to decide when to stop searching for related papers. The main concern was that this research would duplicate another research effort which had not been discovered during the literature search and, therefore, considerable effort was expended on the search before this possibility was discounted. It also took longer than expected to complete the case study analysis as there was a large amount of material to review and, in some instances, clarification was required from the case study participants. On reflection, it would have been beneficial to extend the case study and to analyze the data on-site.

A.2 RESEARCH APPROACH CRITIQUE

The initial proposal was broadly to investigate the topic of Information Systems (IS) and organizational culture, however, this evolved during the survey phase to become an investigation into IT-enabled organizational change to give the study more relevency within the IS field. During the initial literature search the key journal articles by Orlikowski (1996) and Orlikowski and Hofman (1997) were discovered and the precise objective of the study was defined as extending Orlikowski and Hofman's (1997) Improvisational Change Model to determine if the model is relevant in a different organizational context to the original study.

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Orlikowski's (1996) original study focused on what can be described as a network type organization. Therefore, it was decided to undertake the investigation with a case study of an appropriate hierarchical type organization. The organization originally chosen for the study was a well known, medium sized computer systems company which appeared to have a heirarchical organization and had implemented a new production IS. However, after a feasibility study, it was determined that the Managing Director of this company was not entirely supportive and, although assurances of anonymity were given, fears regarding negative publicity and commercial confidentiality remained. It was decided that this would present an unacceptable risk to the project if permission were withdrawn at a later stage and a case study of this company was discounted.

The case study site that was chosen to fulfill the organizational criterion dictated by the original project objective was a Royal Air Force unit. However, during the case study the data revealed that the technology was non-adaptive contrary to the description given before the study commenced and the initial reaction was that this would weaken the case study findings. However, the Improvisational Change Model was evaluated in both a different organizational and technological context and the findings indicated clearly which context change had caused each organizational, cultural or technological change. Consequently, the case study inadvertently enabled the research to extend Orlikowski and Hofman's (1997) model more than it was originally anticipated.

A qualitative, grounded theory approach was used for the research as this approach has been used extensively across a variety of social science disciplines and it was considered to be suitable for this study due to the socio-technical nature of Information Systems. It was anticipated that a grounded theory approach would enable data to be inductively derived from the case study to build upon and extend Orlikowski and Hofman's (1997) Improvisational Change Model.

There are various forms of grounded theory research and it was initially envisaged that the approach taken would be similar to Strauss and Corbin (1990) who advocate systematically using a set of procedures to develop a grounded theory about a phenomenon. However, in practice this approach was found to be unsuitable for this study for a number of reasons.

Many of the studies that have successfully used a grounded theory approach have focused on a real-time observation of the phenomenon in question. In contrast, this research studied the phenomenon of IT-enabled change retrospectively and, consequently, it was found to be very difficult to apply Strauss and Corbin's (1990) systematic techniques to identify and classify concepts. Also, Strauss and Corbin's (1990) systematic analytical techniques were difficult to understand and apply in practice. This was primarily due to the relative inexperience of the researcher in quantitative analysis techniques such as these. With hindsight, the aim of completing a pure grounded theory study in the two weeks permitted for the case study was over ambitious. However, the findings of this research were enriched using a grounded theory approach and the study showed that, with practice, both the techniques the approach are appropriate for information systems research projects.

A.3 POSSIBLE FUTURE WORK

One obvious area for future work, which would extend Orlikowski and Hofman's (1997) improvisational perspective further, would be to evaluate the Improvisational Change Model in the organizational and technological contexts which have not been addressed by the inital research or by this study. A summary of the different contexts for future research is shown in Table A.3.

ORGANIZATION\TECHNOLOGY	Adaptive	Non-Adaptive
Hierarchical	?	Sandom
Networked	Orlikowski & Hofman	?

Table A.3 - Contexts For Future Research

Another area for future work would be to evaluate the improvisational perspective in the same context as this research using a long-term, real-time, grounded theory approach to inductively generate or extend the existing theory. Also, a long-term, qualitative research into the suggested correlation between user dissatisfaction and user improvisations may be beneficial.

Finally, Orlikowski and Hofman (1997) suggest that their alternative Improvisational Change Model may only enable organizations to take advantage of the enabling capabilities, emerging practices and unanticipated outcomes associated with the use of new technologies. Research into the quantification of any improvisational benefits is an area of research with little data available. Therefore, this is also suggested as an area worthy of further research which could inform both the social sciences and the computer scientists.

Appendix B

THE GROUNDED THEORY RESEARCH METHOD

B.1 BACKGROUND

Before embarking on any research project, basic decisions must be made regarding the most suitable research method for the area under study. Although it has always been possible to mix the methods, most researchers choose either a quantitative or a qualitative approach depending on their particular conviction and the nature of the study (Strauss and Corbin 1990). The research method adopted for this dissertation was that of grounded theory which has been used extensively across a variety of social science disciplines (Glaser and Strauss 1967) and thus was deemed to be suitable for this study due to the socio-technical nature of Information Systems.

B.2 GROUNDED THEORY BASICS

Strauss and Corbin (1990, pp24) define the grounded theory approach as:

> *"...a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon."*

Grounded Theory is an inductive, theory discovering method that allows the researcher to develop a theoretical account of the general features of a subject while simultaneously grounding the account in empirical observations and data (Martin and Turner: 1986). Proponents of grounded theory maintain that theory generated by observations of the empirical world are more valid and useful than those developed from deductive research. The emergent theory is usually detailed and specific to the area under observation, however, a more useful generalization can often be produced from the results. Yin (1989) refers to this technique as *analytic generalization* as opposed to statistical generalization which occurs in quantitative studies when generalizations are made from a statistical sample to a population.

A basic tenet of grounded theory is that to produce accurate and useful results, the complexities of the organizational context must be incorporated into an understanding of the phenomenon, rather than being

simplified or ignored. Glaser and Strauss (1967) maintain that grounded theory facilitates the generation of theories of process, sequence and change pertaining to organizations, positions and social interaction.

The grounded theory approach is used to develop an account of a phenomenon which is theoretical rather than merely descriptive. Descriptive data is arranged according to themes and normally provides only a summary of words taken directly from the data with no interpretation. In contrast, theory uses concepts whereby similar data are grouped and given conceptual labels which requires interpretations to be made on the data. The resultant theory is then used to explain the reality of the phenomenon under observation and to provide a framework for action.

B.3 THEORETICAL SENSITIVITY

Theoretical sensitivity is a term frequently associated with grounded theory which refers to a personal quality of a researcher. Theoretical sensitivity indicates an individual's awareness of the subtleties of meaning of data and the ability to understand the data and to identify the pertinent from the irrelevant. Theoretical sensitivity is derived from a number of sources including technical literature, professional experience and personal experience (Strauss and Corbin 1990). However, there is a trade-off between a high degree of theoretical sensitivity and the need to remain objective during data collection and analysis. Some proponents of grounded theory argue that initial data collection and analysis should take place before consulting and incorporating prior research literature and if existing theoretical constructs are used they must be justified in the data (Chamberlain *et al.* 1995). This is intended to ensure that the analysis is based on the data and that the researcher maintains a reasonable degree of objectivity.

B.4 GROUNDED THEORY COHERENCY

Grounded theory is presented as a highly structured approach to research, however, Chamberlain *et al.* (1995) maintain that there are a number of different epistomological positions towards this approach and a summary of their argument follows:

Charmaz (1990) argues that the original approach proposed by Glaser and Strauss (1967) was inconsistent in promoting both positivistic and phenomenological emphases. More recent variations (Strauss and Corbin 1990; Strauss 1987) retain their positivistic premises but emphasize phenomenology. Glaser (1994) has criticized both Strauss (1987) and Strauss and Corbin's (1990) versions of the approach which he maintains have eroded the essential focus on the data. Stern (1994) maintains that the respective positions outlined by Strauss and by Glaser represent two fundamentally different approaches. In contrast, Charmaz (1990) takes a social constructionist approach to grounded theory, viewing it as a method involving rationalistic and active process, and the outcome of any research using this method as a social construction of the social constructions found and explained in the data.

Appendix C

THE CASE STUDY

C.1 THE SITE - THE RADIO INTRODUCTION UNIT

The case study for this dissertation was conducted at a Royal Air Force unit called The Radio Introduction Unit (RIU). The role of the RIU is to provide the Ministry of Defence and government agencies with an intelligent customer interface with industry and a consultancy service for the engineering and support aspects of introducing new communications engineering equipment and facilities into service. The RIU is an ISO9000 accredited organization and as a result all its core business processes are documented and subject to configuration control.

The RIU employs 75 Service and civilian personnel allocated to 6 project teams. The 5 mainstream project teams each comprise a senior officer, supported by 4 or 5 project officers, and covering the following areas: Radio and Satellite Communications, Telecommunications, Secure Information Systems, Air Traffic and Air Defence and Computer Applications and Software. The teams advise on the selection of communications engineering equipment and monitor the design, development and introduction of such equipment into service. The teams also undertake communications engineering related studies and provide consultative support for MOD staff. The sixth project team is known as Tasking, Research and Publication (TRP) and it is responsible for preparing the maintenance schedules and other documentation needed to support communications engineering systems in service.

Figure C-1 illustrates the organization of the RIU which is structured as a rigid hierarchy with centralized decision making and authority based predominantly on rank. Handy (1985) describes this as a power based type of organization which typically manages by controlling the activities of its employees and is not usually conducive to worker empowerment. Brynjolfsson (1997) categorizes an organization with these features as a heirarchical organization.
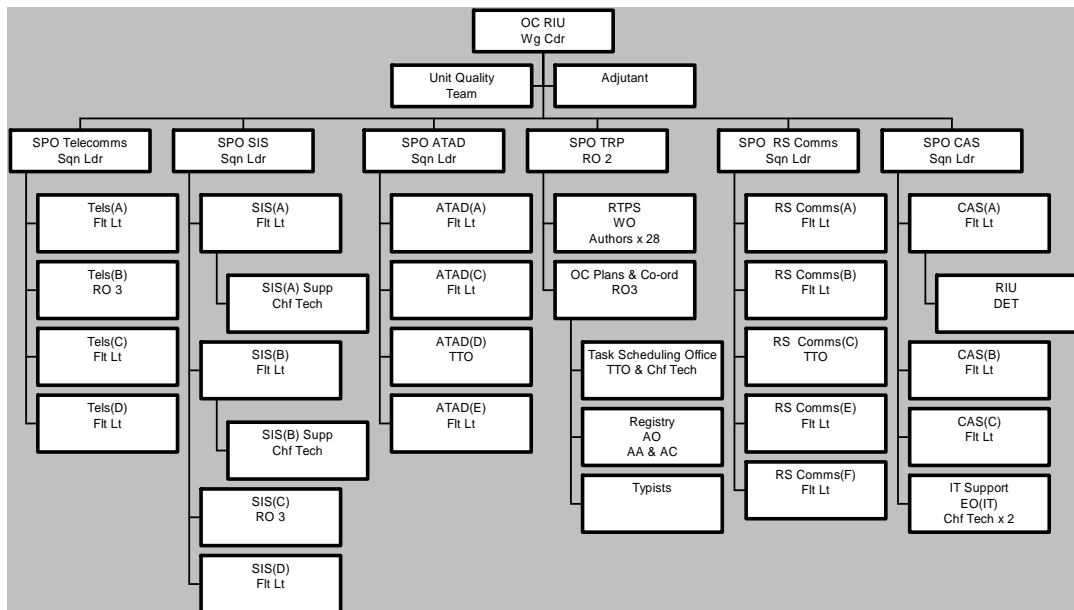
Figure C-6 Radio Introduction Unit Organization

C.2 THE TECHNOLOGY - QUALITY WORKBENCH

Quality Workbench (QWB) is an MS Windows based package first developed by Ideagen Software Limited in 1993. It was first introduced into the RIU in 1995 and the documented intention was to enable configuration control of their Quality Management System (QMS) documentation as a prerequisite to ISO9000 accreditation which was achieved in September 1996.

QWB is a workflow type application which adds the concept of pro-active control. On completion of one activity a task is passed onto the next in the list usually by automated means. Recipients can check outstanding tasks independently and pass work onto the next activity or person. QWB is a software package with minimal configuration capability or adaptability.

The application saves all document records in the Paradox based database including past versions which are compressed to save space. The system prevents access to documents except through the change control system. It has a mechanism built in for ensuring that documents are reviewed and issued in a controlled manner. A document can only be changed through this change request mechanism, ensuring changes and releases are prevented unless the author has the proper authority.

QWB is designed to work over almost any network and optionally can work over an e-mail system, and automatically provides work lists for reviewers, auditors and sign-off authorities whenever a person with the appropriate responsibility logs onto the system on the network. Users are automatically notified of updated documents via the mail messages.

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The whole of this package is aimed at ensuring that non-conformances and change requests are logged and that appropriate action is taken. It provides an environment for simplifying this process by ensuring that all users are aware of their next activities by automating the sending and receiving of e-mail messages. The software provides the main features of a quality system, but does not provide the extras such as Statistical Process Control and quality costing. Also, the current version does not have scheduling capabilities for audits and training. The system is designed to automate a well thought out quality system for organizations where all users have access to computer terminals. It can provide paper output and will still provide all the controls required to meet the ISO9000 standard. However, as a computer based system it places the responsibility for actions firmly on the individual. A summary of the features of QWB is given in Table C-1 and a summary of the project history of QWB is given in Table C.2.

ISO 9000 REQUIREMENT	QWB FEATURE
4.1 Quality Policy Organization	Document Control
4.2 Quality Manual, Quality Plans	Document Control
4.3 Contract Review	
4.4 Design Control	Link to CAD for document version control, issue and release
4.5 Document and Data Control	Document version issue, release and audit management, using standard software packages that run under MS Windows. Links to email to request messages for actions and provides mail messages at log on
4.6 Purchasing	Vendor assessment including rating
4.7 Customer Supplied Product	
4.8 Identification and Traceability	
4.9 Process Control	Document Control - Control Plans
4.10 Inspection and Testing	Document Control - Inspection and Test Plans
4.11 Inspection and Test Equipment	Calibration Module
4.12 Inspection and Test Status	
4.13 Non-conforming Product	Graphical Displays
4.14 Corrective/Preventative Actions	Reports on non-conformities and customer complaints
4.15 Handling, Storage etc	
4.16 Quality Records	From all Modules
4.17 Internal Audits	Audit schedules and Results
4.18 Training	Personnel Records, Training Records and Responsibilities
4.19 Servicing	
4.20 Statistical Methods	Export to spreadsheet for statistical analysis
SYSTEMS	
Computer Platforms	>= 386sx, MS Windows 3.1, MS DOS 5, 4Mb RAM, VGA, Microsoft Mail and Lotus cc:Mail
Integration with other Software	MS Word, WordPerfect, Lotus AmiPro, Lotus 123, Corel Draw, ABC Flowcharter
SUPPORT	
Maintenance and System Tailoring	
Customer Support	Telephone Support

Table C-2 Quality Workbench Features (Burr 1994)

55

DATE	EVENT
12 October 1994	Initial contact with Ideagen Software Limited
17 October 1994	ISO9000 criteria identified
20 October 1994	Quality Workbench demonstration at RIU
11 November 1994	RIU post-demonstration evaluation of Quality Workbench
15 November 1994	Review of Quality Workbench competitors
2 December 1994	Invitation to Ideagen to tender quotation
6 January 1995	Contract awarded
15 January 1995	Software received
1 March 1995	Pilot installation at RIU
5 March 1995	Started development of Quality Management System
12 May 1995	Quality Management System completed
26 June 1996	Documentation check by Lloyds
18 September 1996	ISO9000 accreditation

Table C-3 Quality Workbench Project History

Appendix D

QUESTIONNAIRE AND INTERVIEW SCRIPT

D.1 COVERING E-MAIL

I am currently studying for an MSc in Information Systems at Brunel University which is an APET course for my next post at SDC, RAF Bentley Priory. As part of the MSc, I am conducting field research for my dissertation which is concerned with evaluating how changes occur to organizations when specific types of IT are introduced.

OC RIU has agreed to allow me to conduct my research at the RIU and I have decided to look at how the introduction of Quality WorkBench (QWB) may have changed the RIU. I must stress that I will not be concerned with evaluating the 'success' or otherwise of QWB, I will merely be concentrating on how QWB may have enabled changes to be made to the working practices or structure of the RIU.

I would be grateful if you would answer the questions in the attached MS Word format questionnaire and e-mail them back to me as an MS Word attachment by Mon 7 Jul 97. Please don't be daunted by the number of questions, brief answers will suffice. Also, would you please suggest a convenient time between 7 - 10 Jul 97 when we could meet for approximately 45 min to discuss your answers.

I should point out that any information provided by you in both the questionnaire and in any subsequent meetings will be non-attributable and only a summary of the data collected from all sources will be included in my dissertation.

Please don't hesitate to contact me in Bldg 568, Room 34 or on Ext 6250 if you require any further information.

Thanks for your help.

D.2 QUESTIONNAIRE

Please briefly answer the questions *inline* and e-mail the MS Word attachment back to CSANDOM by Mon 7 Jul 97.

Also, please suggest a convenient time between 8 - 10 Jul 97 when we could meet for approximately 45 min to discuss your answers.

The information you provide will not be conveyed to anyone else. I have only asked for your name and post to see if any patterns emerge from the data based on your location.

Name:

Post:

Date of Arrival at RIU:

What is Quality WorkBench (QWB)?

Why do you think QWB was introduced into the RIU?

What do you think QWB was originally intended to achieve at the RIU?

What changes do you think QWB has made to the RIU's working practices in general?

What changes do you think QWB has made specifically to your working practices?

What changes do you think QWB has made to the overall structure of the RIU?

What changes do you think QWB has made specifically to your section within the RIU?

Is there anything else that you can tell me about the changes that QWB has made to the RIU?

D.3 INTERVIEW SCRIPT

Name　:

Date　:

Time　:

INTRODUCTION

- How changes occur to organizational structures and processes when specific types of IT are introduced.
- Decided to look at how the introduction of Quality WorkBench (QWB) may have changed the RIU.
- Not concerned with evaluating the 'success' or otherwise of QWB. No Politics!
- Any information provided non-attributable and only a summary of the data collected from all sources will be included in my dissertation.

QUESTIONS

- Check through Questionnaire 1 answers.
- How did the 'old' document CC system work?
- Explain/show how you use QWB in your section.
    - Doc CC QMS?
    - Doc CC Tasks?
    - Doc CC APs?
    - Quality Audit?
    - Nonconformities?
    - Customer Details?
    - Customer Complaints?
- Have you ever submitted an SCR for QWB?
- What changes would you make to QWB?
- Do you know of any 'work arounds' that people use with QWB eg: Proxy authorization?

NOTES