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Successful Technology Management:
Cultural and Organisational Dimensions
of MIS implementation in SMEs

Rajeev Kumar Bali

A thesis submitted in partial fulfilment of the requirements of
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November 1999



Successful Technology Management: Cultural and Organisational Dimensions of MIS Implementation in SMEs

RAJEEV KUMAR BALI

ABSTRACT

The aim of this thesis is to provide an original interpretative rationale of the role and effect of culture which may influence the development of a modern Small to Medium sized Enterprise (SME). Substantively, the research is two-fold: firstly, to examine organisational culture and, secondly, its relationship with IT implementations, specifically computer-based Management Information Systems (MIS). An extensive literature review has revealed a lack of synthesis between organisational culture and computer-based implementations, particularly in the SME environment.

The research uses an approach based on ethnographic methods from qualitative research within inductivist confines. A thirty-month ethnographic study at a small engineering firm, verified and validated by triangulation techniques, has been used to form a Conceptual Model for successful MIS implementation. This new Model has been validated in several, unconnected, external organisations. The main case-study is supported by smaller studies which has provided a holistic (and therefore more realistic) view of the complexity of organisational culture.

It is emphasised that achieving a change in organisational culture is a deeply political and turbulent process. Due regard must be given to managerial, cultural, organisational, human, technical, psychological and political issues. The research takes full account of these factors and discusses the importance of core competency, both from the organisation and its actors, to facilitate and realise effective cultural change.

The Model proposed is one methodology for implementation in organisations with cultural and organisational difficulties. Due to the intricacies and complexity of culture, the implementation strategy is potentially a lengthy process.

Contributions are made to knowledge in a number of different arenas. Firstly, a contribution is made in the area of IT change management by proposing a new Model for MIS implementation. The Model is given credibility having been verified and validated at several external organisations. Secondly, a contribution is made in the area of organisational theory as the SME focus provides this vital sector of the business community with additional, pertinent, information when undergoing IT implementations. Finally, the research contributes to knowledge in the area of research methodology as the novel combination of diverse paradigms has resulted in a new research approach for use in the SME environment.

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The very presence of this thesis means that a long-standing ambition has finally been realised. This document pieces together the *dissecta membra* of numerous references, interviews, journals, books, seminars, conferences, transcripts, trial-projects and countless experiences and thoughts, both mine and those of external contributors. When originally seeking suitable research opportunities, I was mindful not to chase another qualification *in lieu* of industrial experience. Likewise, gaining an employed position was always going to leave me unfulfilled and a "best-fit" approach was sought.

The Teaching Company Scheme ('TCS') eventually provided the solution and I am grateful to Professor Graham Cockerham (TCS co-ordinator and the Director of Studies for the research) and Ian Staniforth (TCS Academic Supervisor) from the School of Engineering at Sheffield Hallam University on two counts. Firstly, for selecting me for a position as a TCS Associate at Thermo-X and, secondly, for supporting me there and for constantly reminding me that a more perfect environment for investigating culture change was inconceivable. Thanks also to Mrs Jean Grove (School of Engineering, Sheffield Hallam University) for guidance, support and, above all, expense cheques.

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RKB
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Abbreviations

BPR	Business Process Re-Engineering
CAD	Computer Aided Design
CRIB	Current Research in Britain
HCI	Human Computer Interaction
IIP	Investors in People
IS	Information Systems
IT	Information Technology
MD	Managing Director
MIS	Management Information Systems
MISCO	Management Information Systems Culture-Organisation framework
MRPII	Manufacturing Resources Planning
psycLIT	Psychological Literature
SBA	Small Business Administration
SHU	Sheffield Hallam University
SME	Small to Medium sized Enterprise
SSADM	Structured Systems Analysis and Design Methodology
SSM	Soft Systems Methodology
SWOT	Strengths, Weaknesses, Opportunities, Threats
TCS	Teaching Company Scheme
TEC	Training and Enterprise Council
WQ Manager	Works and Quality Manager
WWW	World Wide Web
Y2K	Year 2000

Research papers published

- (1) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "MISCO: A Conceptual Model for MIS implementations in SMEs", *Information Research*, Vol.4, No.4, June 1999, ISSN: 1368-1613
- (2) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "Changing Organisational Culture for Successful MIS Implementation: A Case Study", *Proceedings of the Sixth International International Conferences on Advances in Management*, Baton Rouge, Louisiana, USA, July 7-10, 1999, Volume 6 (1999), ISSN: 1059-356X
- (3) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "Considering Culture: The MISCO Model For MIS implementations in SMEs", *Proceedings of the Sixth International International Conferences on Advances in Management*, Baton Rouge, Louisiana, USA, July 7-10, 1999, Volume 6 (1999), ISSN: 1059-356X
- (4) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "Successful Technology Management: Considering Organisational Culture", *Proceedings of the Sixth International International Conferences on Advances in Management*, Baton Rouge, Louisiana, USA, July 7-10, 1999, Volume 6 (1999), ISSN: 1059-356X
- (5) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "Ethical Ethnography: Immersion and the role of Access", *Proceedings of the Sixth International International Conferences on Advances in Management*, Baton Rouge, Louisiana, USA, July 7-10, 1999, Volume 6 (1999), ISSN: 1059-356X

Preface

My interest in the areas of management and technology has its roots in my first degree. The course, although essentially management-based, was underpinned by engineering, computing and technical precepts. Industrial organisations - such as Nissan, ICI, British Steel, and ICL - were asked for their medium and long-term graduate requirements. The resounding response was for graduates literate not only in the areas of commerce and business but who also understood engineering and technical concepts: in essence, the hybrid manager.

After successfully completing this course and an IT-based MSc, I worked for several months at various organisations, focussing primarily on technical and organisational issues. These vocational experiences, although commercially quite distinct, highlighted the importance for a balanced and realistic approach to IT implementations. The experiences served to foster my interest in the subject area and exposed me to different types and levels of organisational structure, organisational operations, their reactions to external stimuli and their cultural emphasis, from multi-layered and disciplined to undefined and almost unorthodox.

The Technology-Management relationship was obviously a dominating factor. When searching for a new position, I focussed my job search towards an extensive project which combined IT with managerial issues, dealing with the commercial and organisational aspects of implementing IT.

After discussions with Sheffield Hallam University ('SHU'), a position was offered as part of the Teaching Company Scheme ('TCS', 'Scheme'). The Scheme enables able graduates to carry out commercially important and personally exacting development projects in suitable companies for periods of two years. In doing so, the graduates are given full support of senior company personnel and experts from a collaborating University. The graduate - TCS "Associates" - are appointed to work within the company on two-year contracts. The project, designed to realise corporate aims, is supervised by company staff and supervisors from the academic institution.

The host organisation, Thermo-X Limited ('Thermo-X'), an owner-managed company based near Sheffield, is involved in the design, manufacture and calibration of thermocouples, resistance thermometers and special purpose instruments. Although the vast majority of Thermo-X's products have a low unit cost, the products are, more often than not, failure-critical in industrial process plant applications such as furnaces.

This equipment has enormous downtime costs, thereby necessitating very short delivery times for operational appliances. In order to respond quickly to customer demands, and because of the large variety in product range (over 4000 separate items on offer), Thermo-X keeps relatively high levels of stock (currently 20% of turnover). Offering a fast and flexible service is therefore of paramount importance.

The company possessed a satellite sales office in the West Midlands and, in 1996, acquired a specialist calibration site in South Yorkshire. Early in 1998 the company, for financial and operational reasons, took the decision to close down the South Yorkshire laboratory and move the facility to a new site in Derbyshire.

At the time of writing, Thermo-X employs 30 staff. I was employed as part of the Teaching Company Scheme which I commenced in March 1996. The primary objectives of the Scheme for Thermo-X were the improvement of manufacturing performance by the introduction of stock-control software, the possible introduction of manufacturing resource planning (MRPII) software and techniques and the general improvement of existing operational procedures and control mechanisms. Secondary objectives, and almost an integral part of the primary aims, were the introduction and demonstration of contemporary IT methods and techniques.

Management and shop-floor staff had little knowledge of contemporary IT solutions. but realised that, in order to remain competitive, they must invest in Information Systems. Prior attempts to introduce computer-based systems had met with limited success for a variety of reasons including:

- limited investment by the MD had meant that old systems had been implemented by unqualified and inexperienced personnel
- inefficient communication between management and employees
- several older employees had resisted the implementation, fearing the technology
- employees had not changed their working practices to meet the new requirements

Turning to financial matters, at the time of writing, turnover is £1 million per annum with gross profits around 20%. The inventory levels remain high at £200,000. This is mainly due for the need to keep relatively large stocks of raw material in order to respond quickly to customer demands. Another cause of high inventory cost is the large variety in the product range with more than 4000 separate items on offer.

The company has NAMAS (National Measurement Accreditation Service) and ISO9002 approvals. Main competitors are all locally-based but compete nationally and internationally. The company has less than 10% of the UK market share with a small amount of turnover from export to Turkey and Belgium. The company plans to increase turnover to £2 million in the next 5 years with the export contribution increased to 20% mainly from European markets. The increase is anticipated in equal fractions from the sensor products and the calibration service. The Scheme is expected to increase net profit by £60, 000 per annum, 66% of total profit.

The data for the research at Thermo-X was collected over the thirty month period of the Scheme. Observations were carried out working the same days and hours as a typical Thermo-X employee (a 5 day, 40-hour week). Observations and interviews fell into one of two broad categories: ethnographic, involving employees having fewer than 2 years experience at Thermo-X who were able to provide initial and current impressions of the organisation, and historical, for those employees with more than 2 years experience who were in a position to provide more in-depth perceptions and experiences of the organisation.

Questions and discussions were centred around the core perspectives of management-employee relations, business atmosphere, management goals, internal systems, relationships with suppliers and customers and the reward and punishment system in force at Thermo-X, together with analysis of organisational documents (such as quality manuals, mission statements, annual themes, training documents, memos, postings on notice-boards, personnel manuals and several miscellaneous documents) provided additional and valuable sources of data.

All of these sources combined to present a realistic cultural and organisational perspective of the company. The research project focusses on two key areas: how the Thermo-X culture and structure was formed (and sustained) and how cultural and organisational procedures can be engineered in order to successfully accommodate a MIS.

CONFIDENTIALITY

Authorisation had been obtained from senior management of the host organisation to acknowledge their participation by name in the thesis. However, due to the amount of detail provided in the case study, and the consequent possibility of identifying individual participants, I have taken the decision to withdraw the names of both the company and staff members. The host organisation is therefore referred to by means of the pseudonym "Thermo-X Limited".

1.0 Introduction

1.1 Background

Almost every business, whether large or small, has recognised the role and importance of Information Technology ('IT') in the modern commercial environment. As suggested by Noori [1988] and Meredith [1987], many barriers to new technology adoption in small firms are often as a result of a lack of skills and financial resources.

However, internal politics and bureaucratic tendencies are all too commonplace in many firms, particularly in small to medium sized businesses and, according to Dean [1987], these factors must also be considered.

An article by Bullen [1996], précised in *Management Decision*, reports a survey of 621 international companies which revealed that 85% of corporate-improvement programmes such as Management Information Systems ('MIS'), Total Quality Management ('TQM'), Business Process Reengineering ('BPR'), resulted in failure.

Regarding MIS implementation, work by Pressman [1992] concerning traditional software engineering techniques (the "waterfall model" depicting key stages of Analysis, Design, Coding, Testing and Maintenance) would suggest that failure was due to incorrect planning and specification, accompanied by the possible subsequent procurement of obsolete equipment and inadequate training.

It is my contention that the key to successful technology management is the ability to recognise that change programmes, of any shape or form, are notoriously difficult to consummate. The theoretical intent may well be vastly different to the tangible outcome. The reasons for this are almost always subject to personal opinion rather than based on substantive facts.

When examining the reasons for failure, the spotlight often turns to the management of the company in question. The term "culture" is often being used to describe the management, the organisation and their attitudes to each other and the business.

The reasons given earlier [Noori, 1988; Meredith, 1987; Bullen, 1996] can only go some way towards explaining why such an implementation can fail in a company. I would submit that the possible consideration of the management culture inherent in the company can be just as, if not more, important as the specification and procurement of the system. Traditional change-resistant firms are often oblivious to their internal failings preferring instead to blame "external forces" for their shortcomings.

Psychologists such as Thomas & Chess [1977] and Atkinson et al [1987] have coined the term "personality" to describe the traits that humans possess. Characteristics such as power and fun are examples of such traits. In the same way, organisations too possess a personality, referred to as its *culture*. The definitive meaning of culture can vary from one source to another and, whilst none can be said to be incorrect, some definitions are more appropriate to specific scenarios than others.

Established consultative methods tend to emphasise one or two major issues and do not take the necessary *holistic* stance, ie. to focus on the existing management and company *culture* (and its suitability for the proposed IT change) and also to recognise the importance of the *human element*. These two factors in themselves can often determine the degree of success of any change process. Human nature dictates that people are afraid of the unknown and company staff, almost as a matter of course, are generally wary whenever the word "change" is mentioned.

A vast amount of literature exists regarding culture and cultural change (such as Williams et al [1993]; Smircich [1983]; Schein [1990]; March & Simon [1958]), which will be discussed in detail in Chapter 2.

My own research and review of this material has led me to believe that, for certain situations, it is insufficient and unsuitable, as the methodologies used are often out-moded or out-dated. Additionally, some culture-change techniques are inappropriate to UK firms as the principles concentrate on North American experiences.

Meanwhile the promised IT revolution continues unfettered. I will argue that, whilst the transformation that computer technology has made on a sociological and commercial level cannot be underestimated, all too often the pursuit of newer technology and working practices has been at the expense of equal regard for the correct methods by which to manage the new technology.

The role of IT itself has undergone something of a change over the years. Once considered the domain of technically-oriented people, companies were often structured with a separate, almost isolated, IT department. The technology, however, has transformed itself, becoming universally accessible and proving itself to be an essential cog in the corporate wheel. The revolution, however, has been fraught with difficulties which will be discussed in greater detail in Chapters 4 and 5.

1.2 Research Hypotheses and Justification

My initial interest from a general IS perspective was accompanied by application of this technical viewpoint to the SME environment. This interest was narrowed down to application of Management Information Systems into the SME environment, focussing on the culture and organisational-change dynamics involved. Based on this, the research question can be stated as follows:

*Can MIS success be influenced and affected by
a change in organisational culture?*

The thesis will expand on this central research question and will discuss how full MIS implementation in a UK-based SME is more successful after proper appraisal, and perhaps re-engineering, of the organisational culture in force. Culture change is especially necessary when implementing far-reaching Information Technology programmes.

The pursuit of projected IT benefits must be offset with the inevitable, often massive, operational-procedure changes necessary to both initially receive and successfully accommodate the new technology. Volumes have been written about both organisational culture and Information Technology on an individual basis, some aspects of which will be discussed in the proceeding chapters, but research fusing these two areas is either rare or inappropriate as the findings concentrate on US-experiences.

To complicate matters further, there is a plethora of American-based studies and writings regarding organisational culture which the rest of the world is expected to adhere to. A small British-based contingent (including such authors as Schein [1990], Harrison [1972], Handy [1985] and Hampden-Turner [1990]) has made a valuable contribution to the field as a whole which will be discussed in Chapter 2.

It is my view that it is this very bias that demonstrates a major shortcoming in the research findings to date. The established research emphasis reflects American culture rather than the culture prevalent in the UK.

The occasional European reference in these research findings is often tangential to the main body of the research and bears no real relevance to the study. Respected Ivy-League Universities, such as Harvard Business School, then support these "new" findings, proclaiming them to be nothing short of a management miracle.

This thesis will attempt to redress this major shortcoming and will focus on the cultural and organisational problems when implementing computer-based information systems, specifically a Management Information System, into a small UK business. It is my belief that only when more, truly international, studies are conducted, can Management Studies be considered truly global.

Additionally this thesis will examine the idea, as first suggested by Ward & Peppard [1995], that IT professionals are often attracted to working with the *technology* and not necessarily the *organisation* and that, likewise, managers are often technophobic and ill-trained in technical matters, preferring to leave the IT function to "the specialists".

The situation is therefore conflicting. On one hand, the commercially-oriented mind is focussed on increased profits and performance whilst, on the other hand, the IT-oriented mind concentrates on technical matters with scant regard to the commercial aspects of the organisation. Objectively, both approaches are correct but in an ideal scenario, the two should not be mutually exclusive particularly in small organisations.

The thesis will use an extensive case study, together with established findings, to address such issues as whether culture is an inherent facet of an organisation, whether the formation of the culture takes place over a number of years, whether managerial techniques shape culture (or vice-versa) and, more importantly, whether culture can be changed or engineered to suit impending technical-change projects.

These issues are both multifarious and intricate. The justification for the research will become clearer in Chapter 2, when I shall discuss how established research into the above areas to date has not yet fully addressed the many questions and issues that have arisen. Further justification comes from the Small Business focus. This section of the business community is perhaps more vulnerable to the consequences of expensive Information Systems failing. The fact, as provided by Bullen [1996], that 85% of corporate-improvement programmes end in failure speaks volumes.

Finally, I am confident that the establishment of an "implementation framework" for successful Information System introduction will enable SMEs to learn from the experiences, and possible mistakes, of other SMEs when trying to overhaul their organisations and avoid the prospect of making the same mistakes again.

1.3 Research Objectives

The objectives of the research are:

- (1) To establish the relationship between *cultural and organisational aspects* of implementing IT (specifically a Management Information System) into a UK-based SME. The cultural, human and organisational considerations regarding the specification, selection and implementation of hardware and software will be examined.
- (2) To investigate how such an organisation can effectively use an implementation strategy to convert itself from a *reactive* organisation (one that is not receptive to change and which reacts only when an external stimulus is applied) to a *proactive* one (where the firm is adaptable, change-ready and self-driven in its approach).
- (3) To consider the role of management during the change process and to evaluate the existence and importance of top-level and peer-support.
- (4) To confirm the findings of one company by investigation in a number of other companies

1.4 Research Methodology

As will be discussed in detail in Chapter 4, the nature of the research meant that due consideration had to be given to many wide-ranging disciplines. Subjects as diverse as management, computing, psychology, sociology and anthropology with elements of politics, philosophy and economics were used as and when required.

Although qualitative and quantitative techniques are not mutually-exclusive, my emphasis on qualitative methodologies was due to their reliance, using Yin's [1994] terms, on the questions "How?" and "Why?", rather than the quantitative emphasis on "Who?" and "How Many?".

The net result was the usage of a wide variety of methodological tools. The research made extensive use of qualitative methodological techniques (ethnographic methods such as participant observation, interviews and conversations and phenomenological methods which considered experiences from a subjective perspective) within an inductivist framework.

1.5 Research Outline

Due to the way in which the research has been conducted, the thesis has been broken down into different sections to concentrate on different issues. The thesis is structured as follows:

CHAPTER 1 - INTRODUCTION

This Chapter acts as a foundation to the main body of the thesis and deals with the intent and significance for SMEs hoping to implement IT.

CHAPTER 2 - LITERATURE REVIEW AND RESEARCH ISSUES

Chapter 2 describes how organisations have changed over the years and will appraise the impact of Information Technology in the office environment, both on an organisational and human level. Previous studies and experiences of streamlining traditional office techniques will be examined. The chapter will go on to research the links and complexities between past and present organisational theories.

Management thinking and its relationship to culture will be examined. The importance of companies possessing a correct culture, in preparation for proposed change, will be postulated and results of studies will be used to validate theories proposed.

CHAPTER 3 - RESEARCH METHODOLOGY

Chapter 3 describes the various research methodological techniques used to carry out the research. The role and significance of access, ethics, overt and covert observation techniques will be discussed. Qualitative and quantitative methods will be identified and analysed, as will the psychological aspects of data collection and analysis.

CHAPTER 4 - ORGANISATIONAL CULTURE CHANGE: A CASE STUDY

Chapter 4 uses ethnographic data, collected over a 30-month period, from Thermo-X Limited ('Thermo-X'), a Teaching Company Scheme ('TCS') host organisation. These first-hand accounts are used to gauge perceptions of the usefulness of technology, together with the organisational and cultural changes effected. Prevalent management attitudes are examined, together with the proximate impact on staff attitudes and morale in general.

CHAPTER 5 - CONCEPTUAL MODEL FOR MIS IMPLEMENTATION

Chapter 5 takes a holistical approach to MIS implementation. Applying the lessons learned from the extended ethnographic experience at Thermo-X, a conceptual model is formed for the successful implementation of Management Information Systems in UK-based Small-to-Medium sized Enterprises. Existing implementation approaches are reviewed, in order to identify good and bad practice, and contrasted with the proposed theoretical framework.

CHAPTER 6 - CASE STUDIES: VALIDATING THE MISCO MODEL

Chapter 6 uses data from several UK firms in order to validate the conceptual framework formed in the previous chapter. Exploratory and explanatory proof is provided to support the ethnographic data collected from Thermo-X.

CHAPTER 7 - CONCLUSION

Chapter 7 reiterates the background and cultural and organisational conditions of firms successfully (and unsuccessfully) implementing MISs. The major findings of the research are revisited to bring together the information from the case studies in addition to literature from academic writings to form an original contribution to existing knowledge. Implications and opportunities for further work will be provided.

1.6 Conclusion

This chapter has laid the foundations for the thesis and has introduced the objectives and outline of the research. The methodologies used have been introduced and limitations of the research given. On the basis of the above, the thesis will now explain in detail how the various research processes were carried out.

2.0 Literature Review and Research Issues

2.1 Introduction

This chapter serves as a Literature Review and uses relevant current knowledge and theories in order to present the extent of understanding of organisational culture and Information Systems ('IS') to date. Various data and information sources were used, ranging from library-based information (books, journals, transcripts and articles) through to Internet and CD-based sources including psycLIT (Psychological Literature) and CRIB (Current Research in Britain).

I will begin by introducing the concepts of culture, organisational culture, organisational structure and cultural and organisational change mechanisms. This will be followed by a review of the increasing role of IT in business management, from both a historical and commercial perspective. The concept of a Management Information System ('MIS') will be introduced and distinguished from other areas of IT. Its application to, and impact on, small businesses will be detailed. This will be followed by a discussion of the benefits offered to companies computerising and automating their operations as well as the managerial perspectives on IT.

2.2 Definitions

It is my belief that the study and reporting of any research-based project should begin with clear introductory definitions of the work. To follow a building analogy, without laying these foundations, the following structure soon becomes both difficult and cumbersome.

2.2.1 Culture

What then is culture? Does its definition change from one discipline to another (Management, Anthropology, Sociology) and, if so, is the difference and distinction significant? It would be sensible to restrict the definition of culture to its pertinence and application to this thesis, that is to the areas of Management and Information Technology in a business environment.

The term culture can be used in a variety of contexts. For example:

- (1) describing a person as *cultured* when (s)he comes to appreciate fine art or literature
- (2) on a biological level, cells can be grown in *cultures*
- (3) describing a country's *culture* (those national characteristics indigenous to a country).

Definitions of culture are widespread. The difficulty in refining to a single definition is exacerbated when it is considered that, according to the anthropologists Kroeber & Kluckhohn [1952], over 150 different definitions of the term "culture" have been formed. Little wonder then, that confusion over the accepted definition of culture exists. Smircich [1983] suggests that the plethora of definitions can be readily explained by the fact that the entire concept of culture has been extrapolated from the area of anthropology where there is:

"...no consensus of meaning."

[Smircich, 1983, pp.339-358]

Brown [1995] cites Edward B. Tylor's (1871) definition of culture as:

"the complex whole which includes knowledge, beliefs, art, morals, law, custom...acquired by man."

[Tylor, 1871, pp.3]

Pheyse [1993] suggests that culture is:

"...a way of seeing that is common to many people."

[Pheyse, 1993, pp.3]

Perhaps the most cited definition of culture is that of Geert Hofstede [1994b], a leading academic and consultant in organisational anthropology and international management. Based in the Netherlands, and the founding director of the Institute for Research on Intercultural Cooperation (IRIC), Hofstede's professional career has spanned foreman, plant manager and chief psychologist on the international staff of IBM. In his book *Cultures and Organisations*, Hofstede analogises organisational culture as the "software of the mind" and suggests that culture can be thought of as the:

"...collective programming of the human mind that distinguishes the members of one human group from those of another."

[Hofstede, 1994b, pp.5]

I would, in basic terms, simply describe organisational culture as "an attitude which governs the way things are done in an organisation", closely apeing the viewpoint of Bower [1966] who describes culture as "the way things are done around here".

Hofstede [*ibid.*, pp.4] further states that each person carries patterns of thinking and feeling which stay with them throughout their life. Acquired and learnt during childhood, when the person is most open to learning, assimilation and dissemination of information, these patterns gradually become entrenched within the persona.

Figure 2.1 [Hofstede, 1994b, pp.6] depicts the distinction between human nature on one side and an individual's personality on the other side. When learning something else, the established patterns must be *unlearned* which Hofstede [1994b] says is inherently more difficult. A case of old habits dying hard?

Following on from this, Hofstede [1994b] puts forward the idea that all countries possess a factor called *management*, its meaning changing from one country to another. In order to understand its processes and problems, historical and cultural insights into local phenomena are taken into account.

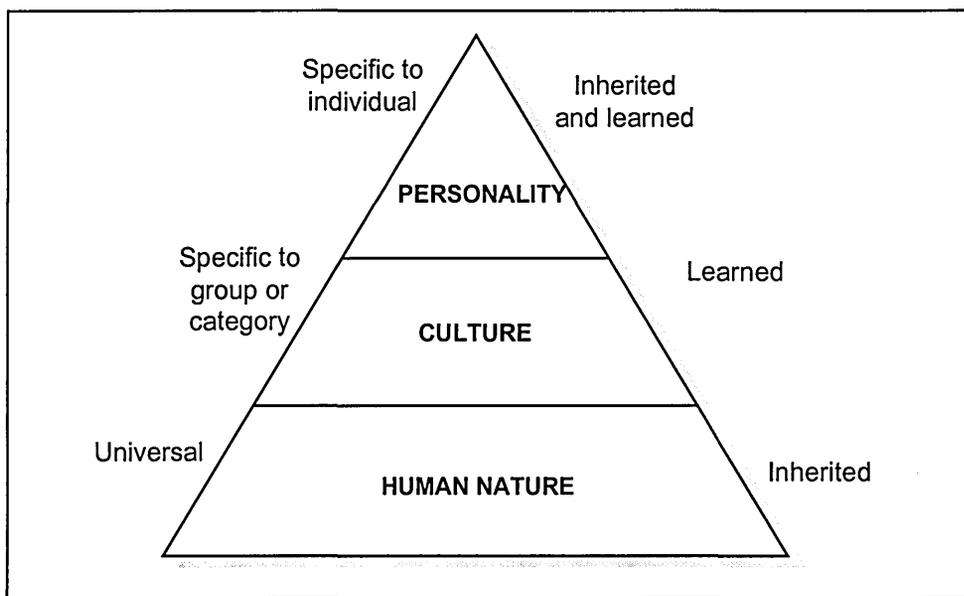


Figure 2.1: Levels of Mental Programming

In yet another of his works, Hofstede [1993] has suggested that universal management theories are non-existent and vary according to the country in which they are applied. It may seem that I have over-examined Hofstede's work but I would argue that this only serves to reinforce its importance. Indeed, such is its acceptance that various authors agree that his work:

"...has had a major influence on how we think about the culture of organisations in different countries."

[Brown, 1995, pp.46]

Various studies (Vitell et al [1993]; Pennings [1993]; Thornhill [1993]) use Hofstede's various contributions to explain the effects of culture on decision making, executive award systems and training regimens respectively. But how exactly can culture be measured? According to Kroeber & Kluckhohn [1952], culture possesses the following traits:

- *Culture can be shared* by individuals in families or by individuals in society
- *Culture is learned* by the acquisition and transmission of teachings and experience
- *Culture is transgenerational* and is passed from one generation to another
- *Culture is influenced by perception* in the shaping of mannerisms, behaviour and provides the structure to how a person regards their environment
- *Culture is adaptive* and is based on a person's ability to change or adapt

2.2.2 Organisational Culture

Much like trying to pinpoint a single definition of culture, defining and classifying *organisation* is equally difficult and opinion is divided. Robbins [1991] suggests that an organisation is a systematic arrangement of people who come together to achieve a common purpose whilst Hutchison & Rosenberg [1994] argue that the issue is clouded as the definition changes depending on:

"...who is asking and why they are interested."

[*op.cit.*, 1994, pp.101]

March and Simon [1958] concur, adding that it is substantially easier to give examples of formal organisations than to pinpoint a universally-accepted and formal definition.

It would however still be beneficial to attempt, for the purposes of this thesis, an "uncontroversial" definition of organisation. I would therefore support the view that an organisation is a:

"...social arrangement for the controlled performance of collective goals."

[Huczynski & Buchanan, 1991, pp.1]

According to Gibson et al [1994], in order to animate the organisation, *processes* (such as communications and decision-making) and *structures* (formalised patterns of how its people and jobs are grouped) are used. Extending the notion of culture into an organisation leads us to the definition of *organisational culture*. Schein [1990] highlights the pattern of basic assumptions used by individuals and groups to deal with an organisation's personality and *feel* which forms the basis of that organisation's culture.

A biography of Richard Branson [Jackson, 1995] profiles the conception and growth of the *Virgin* brand. Great insight is provided into Branson's corporate philosophy with Branson himself attributing his personal and corporate success to the organisational culture present. Jackson [*ibid.*, pp.303] summarises the *Virgin* culture as one where:

"...it was idle to ask whether something could be done. Virgin people would assume that it could, and confine themselves to asking how".

[*loc.cit.*].

Borman [1995] attempts to list some examples of indexes which can combine to form the basis of an organisation's culture (as one can appreciate, the list is not exhaustive): these include reports, letters, memos, emails, health & safety regulations and rulebooks. Some examples of protocols of a more-verbalised nature are given: forms of addresses, repeated stories/myths, "in"-jokes, rumours and speculation. Factors such as dressing styles/requirements and *de rigueur* career paths are cited as additional factors which can contribute to and act as a measure of an organisation's culture.

It is this same organisational culture that defines behaviour and which motivates its individuals and affects the way that the organisation processes information. Many researchers and authors (Gibson et al [1994]; David Hill Associates [1987]; Gummesson [1988]) compare organisations with an iceberg, depicted in Figure 2.2. According to Gummesson [1988], an iceberg only shows 10-15 percent of its total mass above the surface water and the iceberg is thus a valid and appropriate model to show the visible and non-visible facets to an organisation's culture. I would submit that this conceptualisation upholds the importance of deeper research into an organisation in order to gain access to the "hidden" 85-90 percent of the organisation's value and belief system.

Academic studies and consultancy projects in the UK, Europe and the United States have been carried out by Hampden-Turner [1990] in order to better understand the nature of organisational culture. Hampden-Turner [1990], educated both in the UK and America, regularly lectures on the topic throughout the world and is in a position to comment on different cultural attitudes between countries. He suggests that the concept of organisational culture can also be compared to the notion of a Psychologist's inkblots, where a patient is asked to describe what (s)he "sees".

I would offer the suggestion that shared thoughts, ideals and procedures all contribute to forming a company's culture. The culture of some Japanese-owned car manufacturers, such as Nissan and Honda, starting their day with cross-plant exercises in the yard serves as a suitable example.

It should be remembered however that the Japanese, as opposed to the British or the Americans, live in quite different environments in anthropological and commercial terms. Initially in the UK, cross-plant exercises must have seemed alien to the workers but, as suggested by Fiedler et al [1988], the feeling of togetherness and bonding has combined to overcome any awkwardness to make this "norm" work in the UK-based plants.

The prevailing patterns of behaviour that form a company culture are generally less explicit than formal rules and procedures. Nevertheless, these patterns can often be a powerful influence on the way that employees and managers approach commercial objectives, be they profit maximisation or customer care. Robbins [1991] identifies organisational culture as being a mix of ten key characteristics:

- *Individual initiative* describing the degree of freedom, flexibility and responsibility an individual has
- *Integration* or the extent to which units within the organisation are encouraged to operate in a coordinated manner
- *Control* deals with the rules and regulations that govern an individual's working day
- *Risk tolerance* describing the extent to which individuals are encouraged in terms of innovation and aggression
- *Direction* describing the extent to which an organisation develops clear objectives for staff to follow

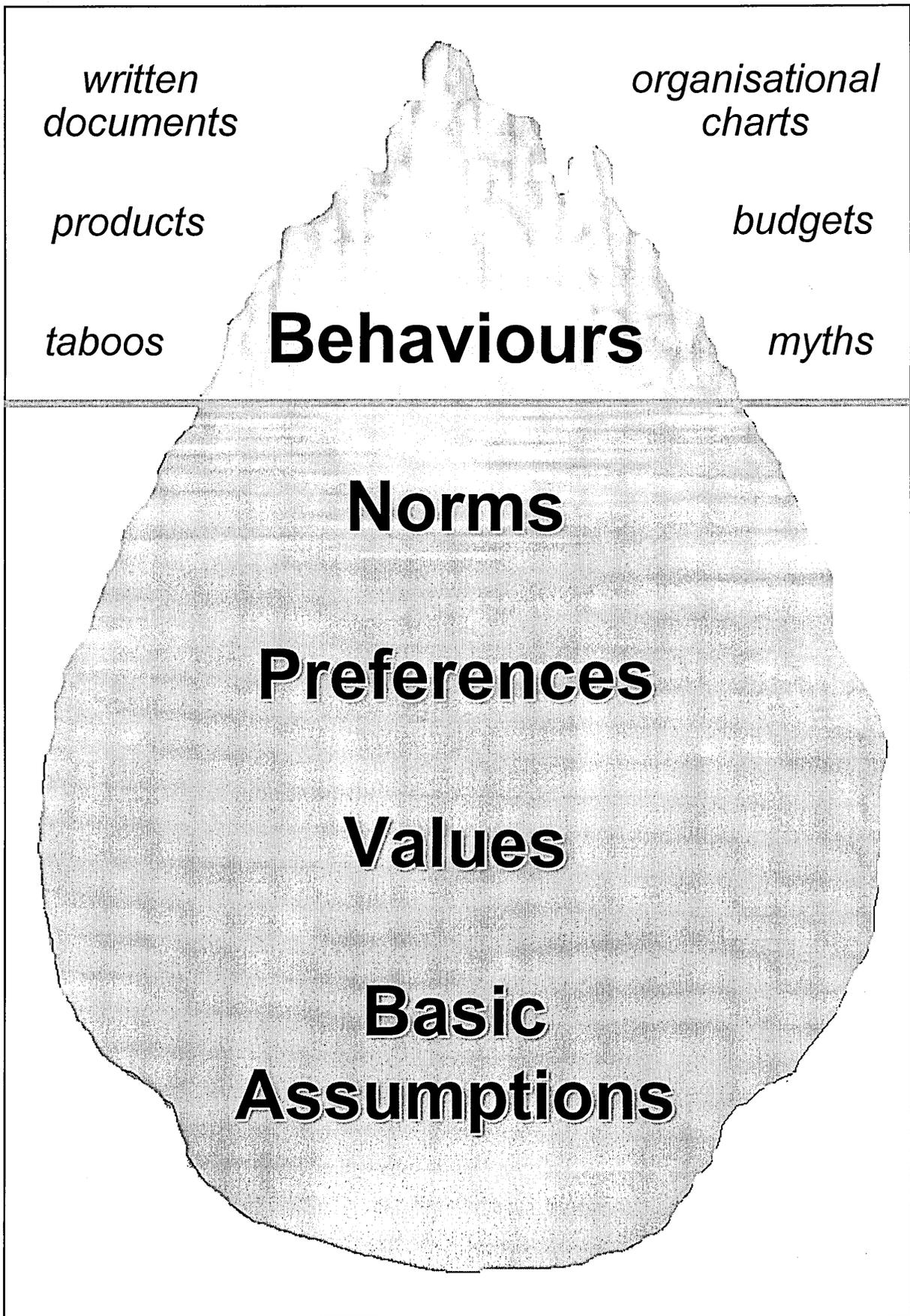


Figure 2.2: A Model of Culture

- *Reward systems* including the degree to which factors such as salary increases are based on employee performance criteria
- *Communication patterns* deal with the way an organisation's communications are related to the management structure
- *Conflict tolerance* details whether individuals are encouraged to air (and hopefully resolve) grievances freely
- *Management support* includes the extent to which management provide clear channels of communication
- *Identity* takes into account the way in which individuals identify with and "fit in" to the organisation, rather than their own (often narrow) sphere of experience

Additionally, company cultures can have either a positive (helping productivity) or negative (hindering productivity) effect. Increasingly, greater importance has been attached to improving or, in some cases, creating a corporate culture. How this is achieved will be described in detail later in the thesis.

Whilst there is nothing inherently incorrect with Robbins' "10-point" approach, it is my contention that this approach is too formal and regimented in its outlook. I believe that a "softer" approach would be beneficial in the interests of clarity and understanding and agree with the "alternative" characteristics cited by Williams et al [1993] (a group of UK researchers who were commissioned to write a book by the Institute of Personnel Management with the aim of shedding light on the UK experience of cultural change) who argue that:

- *culture is learnt* - environmental conditions are the foundations for individual's beliefs, attitudes and values, which in turn dictate the culture of the organisation. Both internal (the socio-technical facets of the organisation, encompassing the internal mechanisms such as planning, control, technology, decision-making processes and training) and external (factors such as economic, legislative and technological influences) organisational environments can affect organisational culture.
- *culture is both an input and an output* - influenced by the socio-technical systems of the organisation, organisational culture is the result of actions and elements of future action, best depicted by Figure 2.3 (from Williams et al [1993], pp.16).

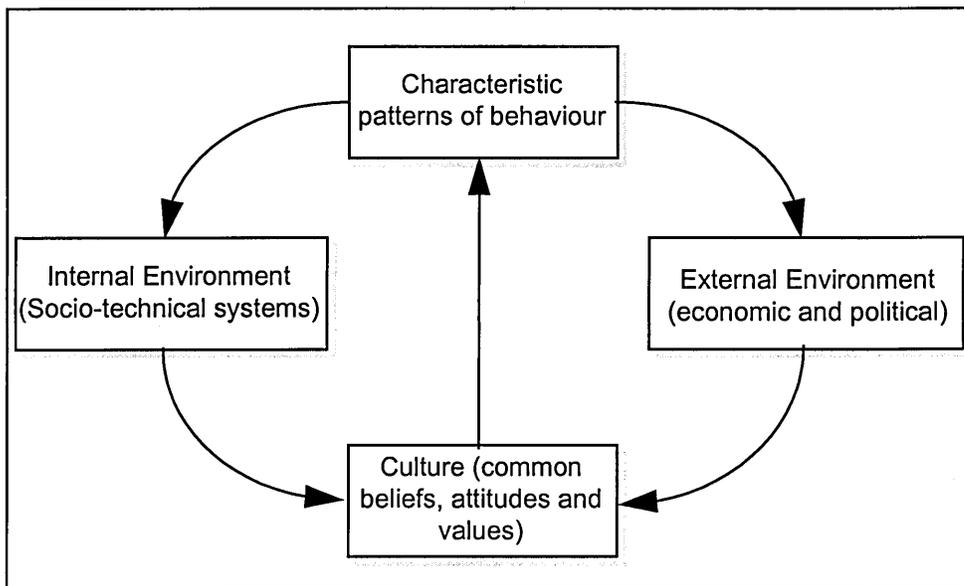


Figure 2.3: Culture as an input and an output

Figure 2.3 shows that organisational culture is influenced by the socio-technical systems of the organisation, which are in turn influenced by the common beliefs, attitudes and values of its members. The procedures adopted by management create the work environment for the other members of the organisation.

If managers have been members of the organisation for some time, they themselves can be a product of the culture. Hence their strategies and procedures have, almost inevitably, been conditioned by the culture. Given that culture is both an input and output, it is likely that this attitude is both self-perpetuating and highly resistant to change.

- *culture is partly unconscious* - commonly held beliefs are unconscious on two levels. Firstly, members unconsciously process information that influences the way in which they think. Secondly, the conscious beliefs, attitudes and values that underlie behaviour may repeatedly lead to success to the extent that they are taken for granted.
- *culture is historically based* - organisations are based on the assumptions and structures of their original founders. Once a particular business direction has been decided upon, successive management generations are often tied to the inherent structures and organisational assumptions which have been set. The original beliefs, attitudes and values (which make up the original organisational culture) may influence successive management generations as organisational decisions are made within the context of the pre-existing culture.
- *culture is commonly-held* - culture, on an organisational and societal level, can be shared, as different individuals would be affiliated to groups containing similarly like-minded individuals. For example, an organisation spread over many sites may comprise individuals who possess common attitudes, thoughts and behaviour, despite being separated geographically.

- *culture is heterogeneous* - In reality, beliefs, attitudes and values are common to work groups, departments, organisations and society. Hence, culture can be common between individuals in a marketing department of a large organisation but this culture may not be shared with, perhaps, the IT department (who would possess their own, distinct, set of beliefs, attitudes and values). The existence of sub-cultures can be beneficial if a department's culture results in increased focus on their aims and objectives. Conversely, sub-cultures can also have a detrimental effect if common co-ordination over the organisation is limited.

In order to depict the manifestation of culture at different levels in an organisation, Hofstede [ibid, 1994] developed the concept of the "Cultural Onion". For the purposes of this thesis, I have adapted the diagram [Figure 2.4] to also include organisational structures.

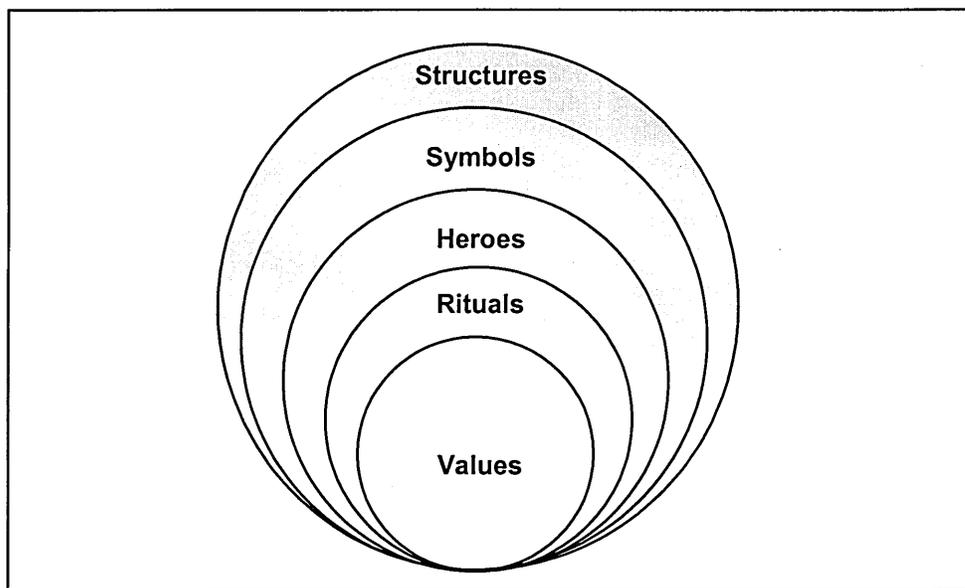


Figure 2.4: *The Cultural Onion*

Referring to Figure 2.4, (and paraphrasing Hofstede's [1994] thoughts), at the heart of the cultural onion is the organisation's core *values* (beliefs which hold and guide the organisation's progress). Surrounding this layer is the *ritual* layer (for example, the organisation's approach to employee relations or the tendency to arrangements of office parties).

The next layer is *heroes* and describes the individuals in the organisation and their respective competencies and behaviours. This layer is surrounded by *symbols* (the outward signs of the organisation, for example the corporate image). The final layer, *structures*, encases the inner layers and is the control and guidance mechanism of the firm, which dictates how the organisation's activities are planned and co-ordinated.

After analysing the various layers to the diagram, it is my contention that organisational change consultants (and researchers) try to change and influence the outer layer (structure) and make little inroads into the deeper layers of the "onion". To paraphrase the thoughts of an anonymous author on the Internet [Anon, 1997], I would urge caution when attempting to change organisations as *real* change has to cut right through to the core of the onion, which, like the vegetable, often leads to tears.

The manifestation of culture at different levels in an organisation leads us to define *management*. Authors such as Earl [1989] and Mintzberg [1989] presents management as a generic term which describes how different activities are completed efficiently with and through other people. This notion is extended by breaking down management into the four distinct functions of *planning* (the definition of goals, strategy establishment), *organising* (which tasks are to be done by whom and reporting structures), *leading* (motivation of employees, conflict resolution) and *controlling* (monitoring activities ensuring fulfilment to prior objectives).

As UK organisations become increasingly oriented towards a European, if not global, market, the significance of cultural understanding becomes increasingly important. Dudley [1990] puts forward the notion that an organisation that fails to reflect the changing needs and requirements of a (global) market will fail in its attempt to re-focus any competitive edge it may already have. Hence, competitively, it will be outperformed.

Echoing the sentiments of McGregors' Theories X and Y, I would suggest that employees would much prefer to be treated as individuals, reacting positively to autonomy and recognition and the freedom to express themselves creatively (Theory Y), rather than the closely-supervised, "carrot-and-stick" mentality suggested by Theory X. Considering and respecting cultural influences, both in terms of nationality and organisation, is an integral part of Theory Y.

However changing, or creating from scratch, a company culture is far from easy as culture seems to protect itself from any external attempts to alter its familiar state. Once established, cultures - and those persons operating within their familiar confines - are reluctant to change. As will be discussed, it is this very familiarity that breeds contempt and is a major blame-factor when analysing unsuccessful IT overhauls in firms. Once practices and attitudes are learnt and are firmly established, new methods are treated with suspicion and resistance to change sets in.

Having given definitions for culture, organisation and organisational culture, I can now apply these aspects to the structures of an organisation. Harrison's [1972] framework consists of four cultural types and is used as a basis for comparison between organisational cultures. The four cultural approaches (termed orientations) are:

- *power* - demonstrated by power-hungry and power-motivated organisations who seek to dominate their environment. These organisations treat individuals, departments and other companies as commodities, with no real regard for personal feeling.
- *role* - generally equate to bureaucratic organisations, where strict adherence to rigid procedures is the norm. In this type of organisation, status and titles are important.
- *task* - is where structures and actions are judged by their contribution to the main organisational objectives. Executing these aims successfully is of paramount importance.
- *people* - where employees are regarded as the organisation's most important asset. Action by consensus of opinion is normal. Staff welfare, personal and professional development are key facets.

After analysis of Harrison's [1972] typologies, I would simplify his orientations by typifying *power cultures* as those whose managerial stance is "do as I say", *role cultures* as those whose management attitude is "rules and regulations are King", *task cultures* as those whose managerial style is "teamwork gets the job done" and *people cultures* as those whose managerial stance is "people first".

Carnall [1995], carried out studies in the UK and focussed on change on three levels: (1) *Psychological*, identifying the attitudes and skills needed to be an effective change leader, (2) *Managerial*, detailing how managers plan the change process to help ensure implementations without setbacks and (3) *Strategic*, showing how change must be managed as part of a coherent strategic plan. Carnall [1995] broadly agrees with Figure 2.5 but suggests that there are six model structures:

- (1) *Entrepreneurial structure* - a relatively simple model where everything depends on the owner of the business who makes all decisions. Other employees are taken on to carry out specific tasks but, because of little or no departmental structuring, this actually increases the organisation's flexibility.
- (2) *Functional structure* - where an organisation is split into distinct activities (such as marketing, legal, IT) and co-ordination takes place by a board of directors, overseen by a managing director.
- (3) *Product structure* - building on the precepts of a functional structure, the product structure makes individuals responsible for particular products and services. A group is allocated responsibility for particular products or range of products and/or services and are allocated specialists from disciplines such as marketing, legal and engineering. In this manner, these product groups are better equipped to respond to the demands of the market.
- (4) *Divisional structure* - as an organisation increases in size, senior management become less concerned with the day-to-day operations, preferring to concentrate on medium to long-term strategies. Dividing the company into autonomous divisions means that everyday decisions are carried out by each separate division, perhaps concentrating on products or markets. Each division often has management committees which would then report to the organisation's senior management. The divisional structure means that considerations regarding costs and profit are left to the committees of the autonomous divisions, leaving Senior Management to concentrate on other matters. Accountability and responsibility is "pushed down" through the organisation.

- (5) *Matrix structure* - are often found when an organisation deals with more than one project at a time, calling for various co-ordination skills. As projects may be medium to long-term, this would require the co-ordination of projects, in terms of specialist knowledge and the timely deployment of necessary resources. Matrix structures enables the effective development of specialists who are working towards the objectives of a project whilst providing a base for the flexible use of these professionals.
- (6) *Federal structure* - building on the foundations of the divisional structure, distinct business units are introduced. Each unit has autonomous responsibility over its product market without resort to a divisional structure. Federal structures allow for clear accountability and ensures that the bulk of resources is not expended at divisional level.

There is common agreement (Harrison [1972]; Carnall [1995]; Pheysey [1993]; Handy [1985]; Robbins [1991]) that organisational model structures and cultural orientations are not mutually-exclusive and can be integrated with one another depending on the circumstance, the culture in force and the management *in situ* at an organisation.

2.2.3 Competence and Culture

McAuley [1994], a UK-based academic and qualified psychotherapist, advocates that organisational culture can be idealised in the form of two models: *corporate* culture, in which managerial control is emphasised, and *ensemble* culture, in which organisational members' autonomy is preserved. McAuley [1994] uses these two stylised cultures have been used to demonstrate the relationship between the managerial process, organisational culture and competence.

Competence in this context refers to the aptitude and proficiency of organisational members. Competence can be used in the same manner as an index in order to measure the acceptance or rejection of activities or behaviour of an organisational member. In this manner, competence can indicate the cultural bearing of the organisation.

In a corporate culture, the emphasis of competence is on the extent and flexibility of control [McAuley, 1994]. Culture is viewed as a control sub-system and a determinant that can be controlled and managed by managers deemed to be competent. In the corporate culture, management of precepts and variables (including culture itself) is through a variety of control mechanisms. Managerial structures and managerial controls are present for the organisation's interests. This has been referred to as the Competency Movement. An ensemble culture occurs when managerial expertise (the art or practice of management) is on a level par with other skills and knowledge brought into the organisation by other members.

Arguments regarding competency and its relationship to organisational culture are supported by researchers such as Bate [1990]. The espousal of idealised values in corporate and ensemble cultures is tempered by the notion of the existence of competency within the organisation (and hence the culture in force). If certain organisational members, deemed to be competent and a core component of the culture, fall out of favour then:

"...where exactly the same behaviour that constituted 'competent' behaviour can come to be reconstructed as 'incompetent'"

[McAuley, 1994, pp.428]

In this way, core competency can be regarded as a key facet of organisational culture. By extension, this is of paramount important when attempting to change this culture or any part of its constituent components.

2.3 Attitudes, Beliefs and Values: How Organisational Culture is formed

I have already discussed earlier in this chapter the notion that the cultural core of an organisation consists of attitudes, beliefs and values. An investigation of exactly what attitudes, beliefs and values are, how they are formed and how they are then commonly-held will be useful in determining the basis of how organisational culture is formed.

Williams et al [1993] offer a model, reproduced in Figure 2.5, to show the relationship between attitudes, values and behaviour and the relationship of these three facets with the sets of beliefs that individuals or organisations possess. The authors state that our attitudes, values and behaviour are controlled by the sets of beliefs possessed but that:

"...the sets of beliefs underlying our attitude or value may differ from that which determines how we act"

[*ibid.*, pp.46]

By way of example, if an organisation was keen to improve customer service [Williams et al, 1993], the beliefs regarding the benefits associated with increased service to customers, the beliefs regarding employees' own abilities to heighten customer service and the beliefs about altering the social norms in that organisation all must be changed before the improvements could be realised.

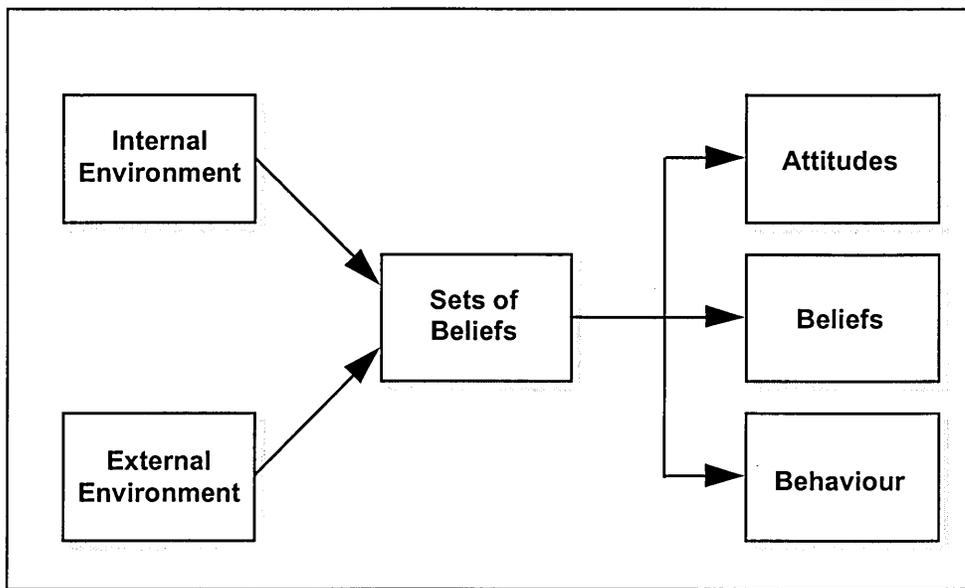


Figure 2.5: Relationship between attitudes, beliefs and behaviour

From the above example, it can be seen that the beliefs influencing an organisation's behaviour stem from the work environment. By extension, if an organisation's culture is to be changed, the beliefs held within that organisation have to be changed (Borman, [1983]; Fiedler et al, [1988]). Hofstede [1981, 1994] also relates how beliefs are learnt and gained from our environment, either directly from our own experiences or indirectly from what we are told. Other people's behaviour is often emulated [Williams et al, 1993] if that behaviour leads to success, supporting the argument behind the concept of a role model.

2.4 Changing Organisational Culture

This section will address the research and findings of culture change completed to date and will detail the extent to which organisational culture can be changed. The motivation behind culture-change, the advantages and disadvantages of doing so and, most importantly, how culture change is achieved will be discussed.

It is generally agreed (Schneider [1994]; Zmud [1984]; Earl [1993]) that organisations attempt to change their culture in order to bring about a strategic business change. Williams et al [1995] introduce the hypothesis of whether the culture change was overtly intentional or an unavoidable side-effect of management's attempts to introduce new working practices. They go on to suggest that, when planning organisational change, managers need to be acutely aware of the link between organisational culture and organisational goals.

As confirmed by Hofstede [1981, 1993] and Brown [1995], established researchers in the field of culture have offered a large number of cultural change models with no clear framework in dominance. The reason for this is primarily that these researchers are using different basic definitions for *culture*. By extension, changing culture according to one researcher's model may seem significantly easier than using another researcher's framework.

According to Huczynski & Buchanan [1991], the diverse models and frameworks illustrate omissions and weaknesses as well as their intended strengths. However it should be said that the researchers' models have made great inroads into understanding and facilitating organisational culture change and that the concerns highlighted should be explored further rather than just ignored. Examining and researching these weaknesses will strengthen our understanding of the behaviour of organisations.

A review of the work of several change-management theorists (such as Lundberg [1985], Schein [1985, 1990], Dyer [1985], Gagliardi [1986] and Lewin [1952]) reveals several change-frameworks, each one of which provides different and holistic perspectives on cultural change compared to the ideas put forward by other ideologists.

After analysing these references, I am of the opinion that in order to promulgate the writings of these theorists, a brief synopsis of four theoretical models will serve as a comparison with the detailed analysis and will suitably contrast differences in the approaches by various established cultural researchers.

2.4.1 Lewin

Kurt Lewin [1952] carried out what is regarded as pioneering work in the field of organisational and cultural change. A significant theorist and practitioner in group, interpersonal and community relationships, he was the founding director of the Research Centre for Group Dynamics.

My examination of the work of Lewin [1952] suggests that he eschewed the "grand plan" theories favoured by cultural change experts (which will be analysed later in this chapter), preferring instead to focus on the often complex processes linked with organisational change.

Using an analogy from the discipline of economics, I would venture that this *micro* perspective on change, rather than the *macro*-levels favoured by fellow researchers, examining cultural change processes at the "grass-roots" level would give a more accurate perspective on change. Lewin's [1952] hypotheses for change were based on three phases: *unfreezing*, *change* and *re-freezing* (as depicted in Figure 2.6), all three phases associated with particular aspects of attitudes and behaviours.

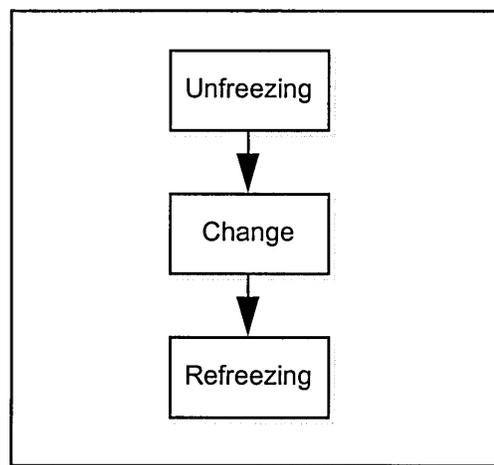


Figure 2.6: Lewin's 3-Phase Model

- (1) *Unfreezing* - After management have taken the decision that organisational culture needs to be changed, possibly in response to unfavourable economic or commercial conditions (such as decreased market share), culture change has entered its first step. The cultural decision taken by management must now be conveyed to the rest of the firm. This "top-down" approach involves sub-stages of *questioning* and challenging the established organisational structures and conventions of the company. This can be done by the introduction of experienced management consultants who, unlike existing workers, could be overtly critical of existing practices, followed closely by a rationalisation period, (what I would describe as an "emotional-support" period). Here, the anticipated impact of the impending change is explained to staff and where company-wide commitment to the project is sought.

- (2) *Change* - once a working rapport has been established with staff, this stage involves ensuring that all staff are actively involved in the change process; those who refuse are replaced with ones who will. The old culture is *degraded*, with new goals, techniques and objectives promoted (for example in the move from autocracy to autonomy) promoted, all the while new concepts being contrasted with the old culture. This phase has the added advantage of promoting a groupwork ethic within the organisation. This, in itself, can assist the

breakdown of traditional and hierarchical barriers. Training programmes, changes in job titles and rapid promotions with sympathetic members of staff further enhance the feeling of a common organisation with a common goal.

- (3) *Refreezing* - once the management consultants have left, staff at the organisation are left to fend for themselves, putting into practice what had been learned in the *Change* phase. Continued support from management, coupled with refresher training courses and evaluation of lessons learned, come together. Hopefully, this results in an organisation which is fully aware of its new attitudes, beliefs and values and which has a familial harmony between its management and its staff.

2.4.2 Schein

Edgar Schein's [1985] model of organisational change (Figure 2.7) suggests that different culture-change techniques are associated with different stages in a company's development.

Schein attempts to analyse the values that govern an organisation's behaviour in order to uncover the underlying assumptions which determine how that organisation reacts.

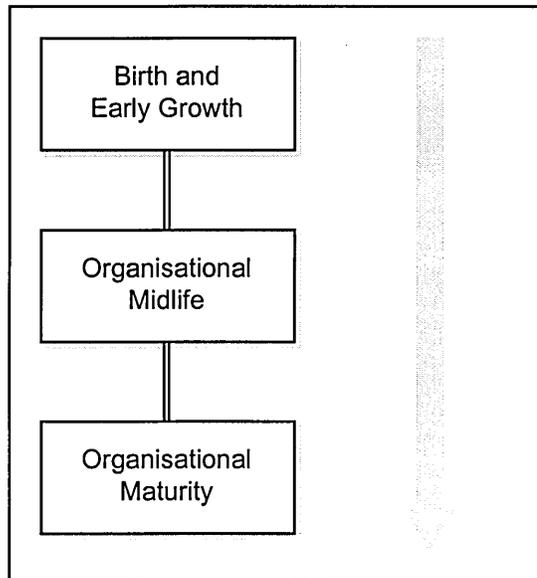


Figure 2.7: Schein's Cultural Change Model

The model puts forward the existence of three different development phases: *birth and early growth*, *organisational midlife* and *organisational maturity* which will now be discussed in greater detail:

- (1) *Birth and Early Growth* - where the conception, development and nurturing period of the organisation leads to a regard that the culture is the "glue" that holds the organisation together. A need for a cultural change arises if the company comes into financial difficulties or if the founder of the organisation gives way to professional managers. If cultural change is necessary, it occurs in one of four evolutionary ways:

- **natural evolution** - where an organisational culture evolves as a natural progression of the organisation's increasing size, complexity or when specific market-oriented departments (eg. marketing, legal) become necessary
 - **self-guided evolution** - where managerial consultants are invited into the firm to enable managers to recognise their own and their organisation's shortcomings and to facilitate culture change.
 - **managed evolution** - where selected existing management at the firm are actively involved in the cultural change process. These persons have been chosen for their experience to date in the firm and, more importantly, for their receptive perspective on the impending change programmes.
 - **managed revolution** - where external consultants and staff are brought in to oversee the change process. This often causes conflict as the new and old culture-supporters clash over differences in opinions.
- (2) *Organisational Midlife* - This secondary phase of the model is when a stable organisational culture has been accomplished and managements' desire is now to be rid of the bad habits that may have developed over time. To change this established culture, Schein [1985] suggests that four stages are involved:
- **planned change** - where the organisation is unfreezed, the change process carried out under assistance and the organisation then re-freezed
 - **technology** - established behaviour of workers needs to be changed if the implementation of new technology is to be accepted. Changing behaviour means that old assumptions and attitudes can be broken down and altered to

accommodate the technology. The advent of the new technology may also cause concern regarding job security and a shift in power and influence

- **change via scandal** - where an organisation rejects one type of culture and then embraces another. This is often a dramatic result process if events are opposite to the values the organisation proclaims it projects. I would offer, by way of example, an organisation that claims to be an Equal Opportunities employer, losing a racial abuse case. This dramatic example can often shock an organisation into rapidly changing its culture.
 - **incrementalism** - where a long-term perspective is taken to achieve decision in the long term. All decisions are taken on a "step by step" basis thereby lessening their potential for conflict with existing staff
- (3) *Organisational Maturity* - the final stage of this model revolves around the scenario when an organisation is stable and lacks the motivation to change itself. To change or re-create a culture that has become dysfunctional requires a set of processes to replace the pre-conceptions regarding the previous cultural turnaround. Three change mechanisms are recognised:
- **coercion** - where management force through the change process, giving employees no option but to go along with the impending processes. As there are no other options, Schein [1985] suggests that the prospects for acceptance are increased. This can be analogised by saying that "the last option is also the first response".

- **turnaround** - comprises a general mix of change mechanisms that include such tools and techniques as unfreezing, change and re-freezing. The empathy that the change manager, or change management team, can convey and receive is an integral part in ensuring that successful implementation occurs.
- **re-organisation and re-birth** - although Schein [1985] shies away from overt commentary on this aspect of the change process, arguing that little has been established regarding its use, it should be said that a total disassembly of the organisation and hence, its culture, is rarely executed. I would submit that this is almost certainly due the inevitable complexity of successful breakdown.

2.4.3 Lundberg

Based at Cornell University, USA, Craig C. Lundberg [1985] is a highly-regarded author and consultant on the subject of organisational culture-change. The model put forward by Lundberg [1985], as depicted in Figure 2.8, pays particular attention to external environments in addition to internal characteristics of organisations. Lundberg [1985] postulated that in order for cultural change to occur, two external conditions are necessary:

- (1) *Domain Forgiveness* - refers to the organisational threat posed by factors such as competition and resources. The more forgiving the environment, the more likely it is that change will occur as the risk is perceived to be less.
- (2) *Organisational Domain Congruence* - if the degree of harmony between an organisation and its domain is not in balance, then change may be perceived to be threatening or unnecessary.

Additionally, four internal conditions are necessary in order to permit change:

- (1) *Sufficient Change Resources* - such as money, time and energy
- (2) *System Readiness* - a sense that people are ready to change
- (3) *Existence of Co-Ordinative and Integrative Mechanisms* - that allow and expedite communication within the organisation
- (4) *Stable Leadership Team* - with sufficient strategic vision and skills to guide and monitor the change process

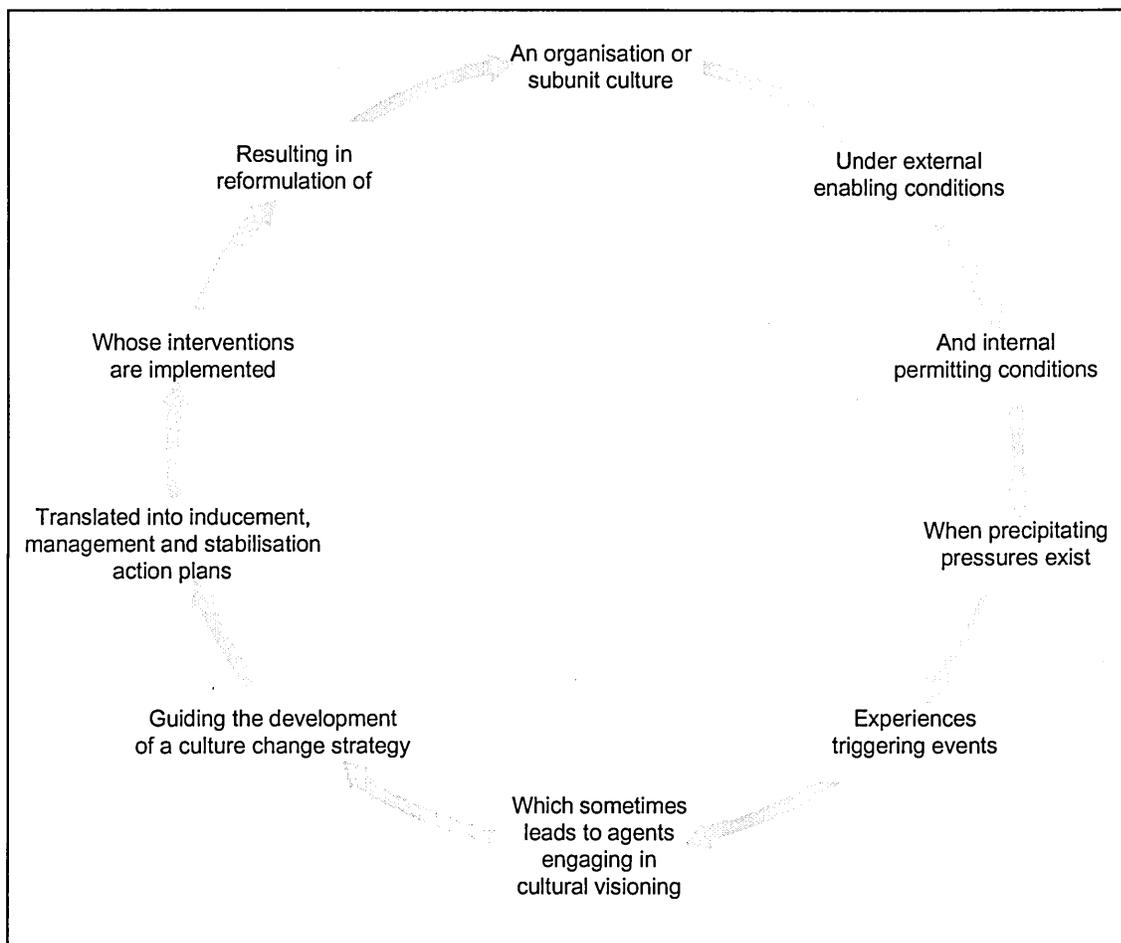


Figure 2.8: Lundberg's Cultural Change Model

Lundberg [1985] then says that if an organisation is faced with certain challenges, then they would be more inclined to change. These challenges, referred to as *precipitating pressures* take one of four forms:

- (1) *Atypical Performance Demands* - including such demands as increasing productivity
- (2) *Stakeholder Pressures* - which originate from parties (such as the public, the Government, the Unions) who have valid interests in the organisations
- (3) *Growth / Decrement Pressures* - pressures that arise from the growth or down-sizing of the organisation

- (4) *Crisis Perception* - as an example, the deprivation of resources, financial or otherwise

This first model requires one final condition before the cultural change mechanism can be animated and that is the occurrence of a catalyst or stimulus which enables the organisation to overhaul its culture, referred to as a *triggering event*. Lundberg [1985] breaks these events down into one of five types:

- (1) *Environmental Calamities* - includes such items as economic phenomena, for example, a recession
- (2) *Environmental Opportunities* - technological breakthroughs
- (3) *Internal Revolutions* - the introduction of a new managerial team
- (4) *External Revolutions* - includes such factors as nationalisation, privatisation or governmental legislation
- (5) *Managerial Crises* - a serious *faux pas* committed by a member of the Senior Management team

In particular, the occurrence of a managerial crisis would normally result in an enquiry process, exposing the flaws in the existing organisational culture which then acts as a basis for cultural change. This basis for change, referred to as *Cultural Visioning*, incorporates a culture change strategy revolving around several action plans. At this point, Lundberg [1985] seems to become vague about the specific mechanics but does concede that his organisational culture change model must be firmly supported by groups of internal and external circumstances, the probability of appropriate occurrences arising being fairly low.

2.4.4 Dyer

Dyer's [1985] framework (figure 2.9) concentrates on a large-scale cultural change rather than the incremental change-mechanism put forward by Gagliardi [1986]. Very much American-biased, as the model derived from five large US case studies, Dyer's [1985] hypothesis on organisational culture change perceives culture change from six perspectives:

- (1) *Leadership ability* - agreeing with Lundberg [1985], a *triggering event* is needed for crisis perception to come about. This then allows the management at the organisation to consider alternative solutions if those which would normally be used are inappropriate. Economic factors, such as recession or excessive inflation, are examples of triggering event.

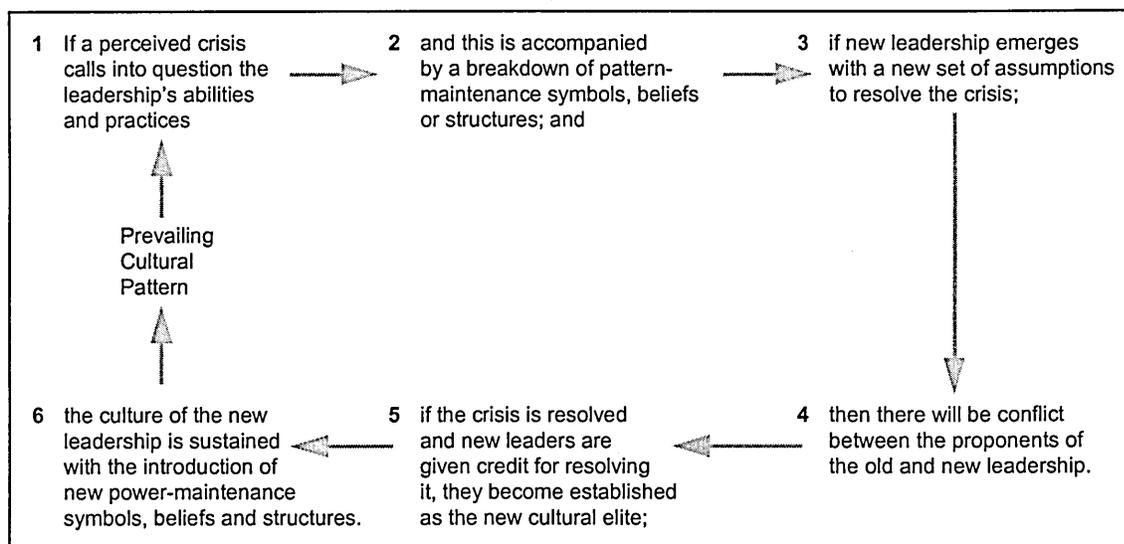


Figure 2.9: Dyer's Cultural Change Model

- (2) *Breakdown* - the perception and increasingly-common knowledge of the triggering event (or crisis) leads to a gradual breakdown in the familiar patterns, beliefs and structures of the organisation. This strongly echoes the views of Hofstede [1981, 1994] who also puts forward the existence, and subsequent breakdown, of closely-named facets to facilitate cultural change.

- (3) *New Assumptions* - in addition to the breakdown of traditional and historical patterns and values in the firm, Dyer [1985] sees the positioning of a new leader (or new leadership team) as being instrumental in the aim of removing traces of the out-going culture.
- (4) *Conflict* - the positioning of a new management head (or team) almost inevitably results in a period of friction between proponents of the old and new regime. Those staff who stubbornly support the old regime are moved to areas where their influence is reduced, asked to leave or, if absolutely necessary, sacked.
- (5) *Crisis Resolvment*- in order to ease any residual tensions, the crisis must be seen by all to have been averted or resolved. Most importantly, the credit for resolvment should fall on the new leader (or leadership team). This then gives the leader, or team, a strong and stable building block on which to base further changes to the organisational culture.
- (6) *New leadership's culture* - as a final stage, any members of staff who are not fully supportive of the new leader's vision are rooted out and the remainder are reminded of the new team's successes. The old team's record is then discredited and dissected. I would simply say that this is in order to contrast the differences between the "Good" and "Bad" leadership vision.

2.4.5 Gagliardi

Based at the Istituto Studi Direzionali (management institute) in Italy, Pasquale Gagliardi [1986] used European-wide case studies to base his cultural change suggestions (depicted in Figure 2.10) on the cultural foundations of assumptions and values, which I have already discussed earlier in this Chapter. Gagliardi [1986] argues the case for incremental change processes rather than, relatively speaking, an overt and harsh approach. Like the other authors already examined, Gagliardi [1986] breaks his cultural change mechanism down into several phases:

- **leadership vision** - management embark on a set of beliefs, which employees are then expected to carry out, under the control and support and management, even if they themselves do not fully share these beliefs
- **belief confirmation** - by experience and demonstration, the belief-set is proven and comes to be subsequently shared and supported by employees
- **belief focus** - a cause-effect scenario develops and employees are encouraged to turn their focus away from the effects of the new belief-set and instead to focus on the belief as a desirable cause
- **shared values** - as a result of successful implementation of the above three techniques, employees come to fully support the new culture

Gagliardi [1986] goes on to argue that organisations do not learn from negative experiences and instead will tend to attribute blame on scapegoats and to find excuses. Tension is an almost inevitable outcome and often a radical change in Senior Management is the best option.

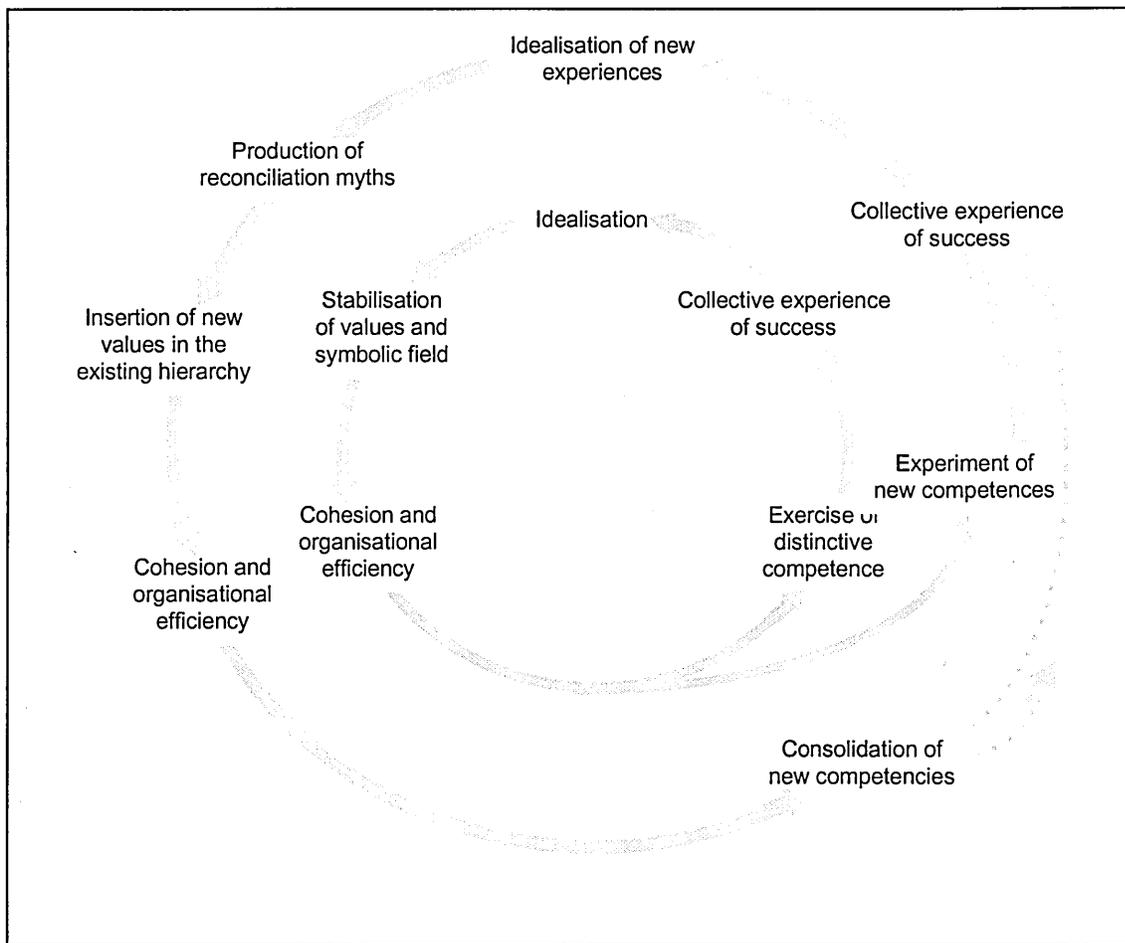


Figure 2.10: Gagliardi's Cultural Change Model

The mechanics of the change process put forward by Gagliardi [1986] resemble an incremental spiral, whereby organisational problems that arise cause the cultural range of options to be expanded and, rather than destroying the basis of the old culture, new values are inserted into the existing culture. As a result, novel practices, closely allied to existing techniques, can be incorporated into the existing organisational culture's values. If this initial process is successful, this value-process may then be repeated, confirming the analogy of a spiral.

But what of the tensions that have arisen as a result of the impending culture change? Gagliardi [1986] suggests that pre-existent myths regarding the success of the organisational change process must be propagated in order to allay these employees' fears and also to convince them that the change is for the better. In the same manner that value-processes are reciprocated on a cyclical basis, the success of the myths can be re-inserted into the change-cycle. Continued success for the change management team means that the mind-set of sceptical employees is brought closer to the aims and objectives of the team.

2.5 Critique of the Cultural Models: Personal Perspectives on Change

Five established cultural change models have been examined and, in this section, I will contrast the differences between them in order to expose each one's strengths and weaknesses. The suitability of the models to small businesses will be discussed along with analysing whether the models revolve around the same fundamental precepts. Importantly, I will reflect on the circumstances associated with each model. For example, have the models been formed using cases from large companies, are they UK or American based or have they been applied to other countries.

Lewin's [1952] cultural examination at the *micro* level of the organisation recognises that cultural change involve a series of intricate steps. However, Lewin [1952] seems to take an almost regimented stance on the stages of cultural change and appears to assume that all members of an organisation will react to the various stages at a uniform pace. In reality, I would suggest that some members may take substantially longer to familiarise themselves with the *Unfreezing* phase. Additionally, the phase of understanding and "hand-holding" lasts throughout the cycle of change and does not, under real-world circumstances, fit into the pre-determined categories of *Change* and *Refreezing*.

What is immediately striking about Schein's [1985] framework is his understanding that cultural change is a many-faceted process, one which rarely fits into the rigid phase-structures offered by researchers such as Lewin [1952]. However, the vagaries of the definitions offered and the abject complexity of those that are explored in detail lead me to believe that a more detailed and focused view is required to accurately match the model to real-world occurrences.

Whilst Lundberg [1985] recognises that cultural change revolves around altering an organisation's assumptions, I would say that the model's regimented stance of factors gives me the impression of "cultural change by numbers". What if an organisation does not possess sufficient *precipitating pressures*? Or if an organisation does not effectively manage the outcomes of the *triggering event*?

These shortcomings and my reiteration that the model seems to be unrealistic lead me to conclude that the model may be unsuitable for many firms. At the same time, I must admit that the generality of his approach is sufficient to represent a "snap-shot" view of an organisation.

In the same vein as Lundberg [1985], the model put forward by Dyer [1985] is also quite general and may not always be suited to a particular organisation. Whilst I can appreciate that the six phases of cultural change offered may have some element of overlap I would say that, because of the model's tendency to consider management's role with little regard for cross-organisation support and empathy, the model is more suitable for taking a quick perspective on the change process.

Finally, the model put forward by Gagliardi [1986] distinguishes between a complete change-overhaul and a cultural change process which is incremental and further argues that the basis for cultural change is through values (or a set of beliefs). I would submit that, because of his thinking that management leadership is wholly responsible for engineering change (neglecting to appreciate the full role paid by cross-organisation participation), that this model has great potential in the SME environment. Like the others, this model may be unsuitable for some organisations but this does not however belittle its usefulness in highlighting the value-role in an organisation.

Reviewing the literature and examining the issues, demonstrated very clearly the different cultural basis that established researchers have used. Although I could argue that none of them may be inherently wrong, how do we know which one is right? Is one better than another? Or is the ideal cultural change model a skilful blend of the most pertinent tools and techniques from the existing range?

My review has shown that organisational culture change involves four common precepts: an initial crisis (or catalyst), strong leadership, the importance of success (and relating this importance across the organisation) and the importance of supporting change.

2.6 The impact of Technology

Another diagram from Williams et al [1993], reproduced in Figure 2.11, shows the major determinants of culture and illustrates that culture (the common attitudes, beliefs and values) results from the external environment, the systems, structure and technology of the organisation and from the behaviour of the work group.

The external environment impacts on the organisation's cultural behaviour as variations such as legislation and politics place varying demands on the organisation. This has an influence on the strategy of the organisation and the systems and technology that are implemented. The recruitment of persons from a wide-ranging social, cultural and educational background will result in idiosyncratic behaviour when these persons are placed in the organisation.

Hofstede [1994b] explains how the technology of an organisation can impact on culture in terms of the *boundaries* of an organisation, the degree of *differentiation* and *integration* of the technology. As Wiseman [1985] tells us, the changing nature of IT over the years has resulted in three distinct conceptual models of IT (namely Data Processing, Management Information Systems and Strategic Information Systems), each model having a different effect on the organisation-technology relationship.

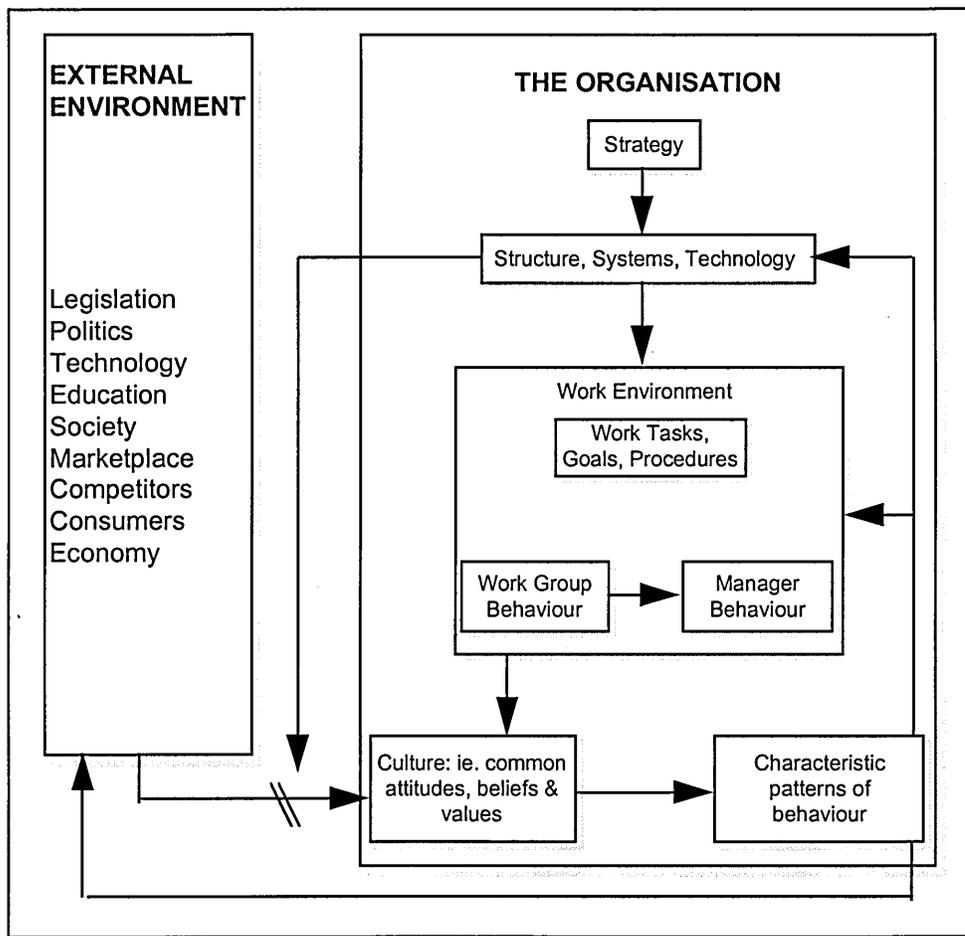


Figure 2.11: Culture: The Organisation and the External Environment

Apart from Zmud [1984], there appears to be little evidence of research into the cultural aspects of the Business-Technology boundary of an organisation. From Ward & Peppard [1995] we find a reference to an article in the *EDP Analyser* ("Organising for the 1990s", Volume 24, No.1) which discusses the merits and demerits of various organisational structures and the varying skills required by IT managers. Little mention is made of the close relationship necessary between IT and business objectives.

They go on to argue that Johnson's [1992] *Cultural Web* (reproduced in Figure 2.12) offers great insight to understanding the cultural aspects of the IT-Business relationship. Figure 2.12, *The Cultural Web*, apes closely the reasoning behind the earlier diagram of *The Cultural Onion* and takes the view that whilst individuals in an organisation may hold distinct attitudes, beliefs and values from their colleagues, each set of attitudes, beliefs and values is nevertheless held at the core of the organisation (The Paradigm circle in the *Cultural Web*).

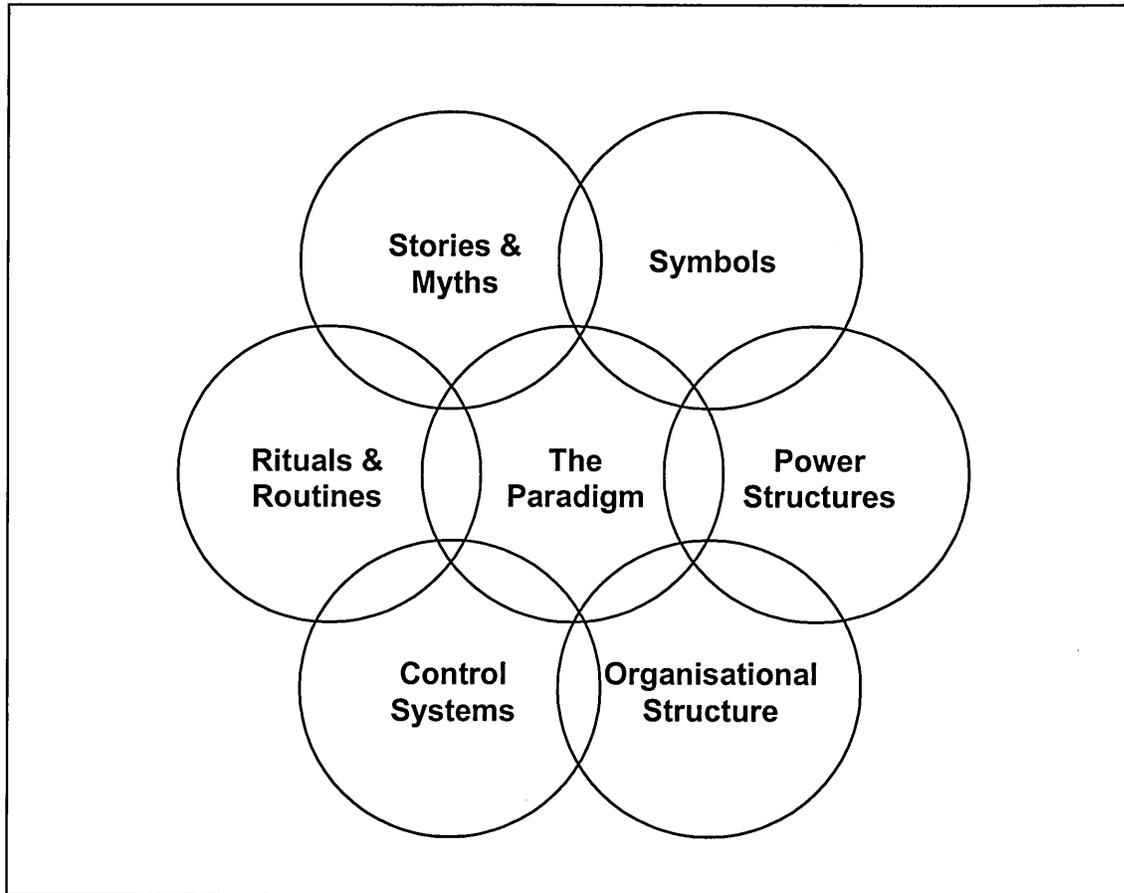


Figure 2.12: *The Cultural Web*

Ward & Peppard [1995] go on to suggest that the IT and business aspects to a business are two distinct paradigms and, furthermore because of these respective paradigms:

"...each creates a relatively homogeneous approach to the interpretation of the complexity that the organisation faces".

[*op.cit.*, pp.18]

The perception of Johnson [1992] is that The Paradigm (in our case, either the Business or IT paradigm) is surrounded by six components through which core attitude, beliefs and values are communicated:

- (1) *Stories and Myths* - almost part of an organisation's folklore and includes tales that employees relate to new employees warning them of past failures/consequences and the fate of maverick recruits
- (2) *Symbols* - includes such aspects as dress codes, job titles, executives' cars and *de rigueur* attitudes such as addressing directors as "Sir"
- (3) *Rituals and Routines* - range from director's signing requisitions to required attendance at weekly board meetings. No real business advantage may be gained by carrying out these duties, but they all encompass rituals that may have historical relevance to the organisation
- (4) *Control Systems* - pay and reward systems and the managerial hierarchy serve as examples of control systems which monitor performance
- (5) *Organisational Structures* - hierarchical structures and product or service-based business units are examples of organisational structures. This includes the position of the IT organisation relative to the position of the Business organisation
- (6) *Power Structures* - are often an indicator of where the major organisational influence is and is often the main target for any change programmes. A common difficulty is when the main personnel targets for change are also those who hold the power.

2.7 A Brief History of Computing

Having discussed the organisational structures, or combinations, possible in a typical firm, the advent of computer technology and its impact on the organisation will now be detailed.

2.7.1 Cultural and Organisational Changes through the years

The IT evolutionary process has resulted in today's reliance on what was once nothing more than an abacus, originating from China (roughly 3000BC). From this point, history becomes clouded [Sherman, 1985] and we are forced to jump to the 17th Century. The reason for this may be that the aptitudes of literacy and numeracy were fiercely guarded by those possessing them, who were consequently reluctant to share the knowledge.

Sherman [1985] further reports the mathematical influence of the abacus continued with the logarithmic contributions of John Napier, swiftly followed by *Napier's Bones*, a series of rods used to aid multiplication, division and square roots, which appeared initially in card form. The first mechanical adding-machine was devised by Blaise Pascal in 1642 who introduced the idea of cogs into his machine. Pascal jnr. invented the machine to help his Father, a French tax-collector, with his duties. Using a Base-10 system, the machine (named a Pascaline) used a series of dials. As the first dial (representing Units) moved ten notches (or a revolution), it moved the next dial (representing Tens) one notch and so on.

Commercially, the machine was a failure due its high cost and because it could only cope with addition. However, as LaMorte [1997] confirms, in 1694, a German mathematician Gottfried Wilhem von Leibniz resolved this by creating a machine that, rather than using simple flat-gears, (as used in the original Pascaline), utilised a stepped-drum gear design which could cope with multiplication.

LaMorte [1997] further explains that, in 1820, another Frenchman, Charles Xavier Thomas de Colmar invented the *arithometer* which could cope with all four basic arithmetic functions. The enhanced functionality of de Colmar's machine resulted in widespread use right up to the First World War and was the last accredited contributor to mechanically-based computers.

Moving to the 19th Century, researchers (Odin [1997]; LaMorte [1997]; Hodges [1983]) are agreed on the contributions of an English mathematician Professor Charles Babbage who is said to have become increasingly annoyed at the numerous errors he found when examining calculations for the Royal Astronomical Society ('RAS') and, according to LaMorte [1997], said:

"I wish to God these calculations had been performed by steam"

[LaMorte, 1997, pp.1]

Odin [1997] confirms Babbage's supposition regarding a link between machines and mathematics, particularly with the assistance of punched cards which led to the invention of his *Difference Engine*. Amusingly, this machine was powered by steam and was used primarily for the creation of mathematically-based tables.

Hodges [1983] reports that, ten years later, this invention was accompanied by Government funding allowing Babbage, by now affectionately referred to as the Father of Computing, the opportunity to construct *The Analytical Engine*, a machine capable of calculating polynomial equations, again using punched cards.

However the machine never reached its potential due to technology constraints. The potential was eventually reached, as Hodges [1983] affirms, in 1890 with Herman Hollerith's American machine powered by electricity. The machine was purpose-built to analyse the 1890 American Census. Hollerith was a prolific entrepreneur and used his new-found fame to start the Tabulating Machine Company in 1896, later to become International Business Machines (IBM).

As Odin [1997] confirms, events progressed slowly for the next few years, this period however witnessing the birth and use of valves, until 1943 when the *Colossus* computer was purpose-built to crack the German *Enigma* codes during World War II. The use of valves continued almost at the same time in the United States with the construction of the first electronic valve-driven machine although neither machine was programmable. Instructions were purpose-built and an inherent part of the machines.

The 1950s brought a fusion of ideas culminating in the coupling of electronic valves and the storage of programs. This decade saw the British-based Ferranti organisation producing commercially-viable computers. Across the Atlantic, Sherman [1985] reports that events similarly progressed culminating in the collaboration of IBM with the Bell Telephone organisation to produce and market computing machines, similar to those produced by Ferranti.

It is interesting to note that the American machines were designed, manufactured and marketed with more financial backing than their British counterparts. As an incidental point, I would suggest that the greater investment and the success of these early American ventures, relative to Britain, gave the United States a head-start in the IT race which has continued exponentially over the years to culminate in their current domination of the IT industry. A case perhaps of "too little, too late" for the UK industry.

The potential of the commercial market for computing machines heightened interest in newer, faster, technology, resulting in the invention of the electronic transistor in 1956, which dramatically increasing sales in the new computing machines. The speed with which technology and costs changed is best exemplified by Sherman [1985] who makes a dramatic analogy by saying that:

".....if cars had developed in the same way as computers...a Rolls Royce car would cost £1.25 and do over a million miles to the gallon"

[*op.cit.*, pp.70]

The emphasis on computing machines directed toward civilian, rather than academic and government institutions, gathered momentum until the 1960s when the United States embarked on their ambitious Space Program. This computing power, in terms of dollars as well as capability, gave computer firms (particularly IBM) the much-needed publicity they required to finally take computers into the home and onto the desk.

At the same time, the American government became wary of the potential security threat to its military computer networks, especially considering the distinct possibility of Global Nuclear War. They quickly realised that there were no in-built safeguards in their current system. If one "link" in the chain was to fail or somehow become disconnected, the entire military network would collapse.

The government's ARPA (Advanced Research and Projects Agency) department developed ARPANET, based on TCP/IP (Transmission Control Protocol/Internet Protocol). ARPANET allowed data to be sent over alternative routes and incorporated safeguards if the preferred route had collapsed. This contingency approach allowed potentially-sensitive data to arrive at its destination intact.

In the mid-1970s, computer manufacturers concentrated on bringing computers to the home. These computers came complete with a suite of user-friendly software packages (especially word processors, spreadsheets and databases), closing the cultural and technical gap between technologists and non-technical users. These same computers were then used secondarily, (cynics may argue primarily), as a platform for video and arcade games.

Pioneers in this field included such giants as Atari and Commodore. In the UK, Sinclair and the BBC computer (manufactured by Acorn) became commonplace in homes and schools alike. IBM introduced its personal computer (or PC) for use in homes, businesses and schools. IBM-clones which entered the market in the proceeding 2 years increased the take-up of PCs, numbers increasing globally from 2 million in 1981 to 5.5 million in 1982. Ten years later, the number had grown to an astonishing 65 million [LaMorte, 1997] worldwide.

In the early 1980s, the military element to ARPANET was moved to a separate network, leaving an empty shell, now known as the Internet or Net. The academic community in the States expressed interest in this network and soon began to use it extensively to transfer data between their institutions. US Government institutions, other than those with military connections such as NASA, joined their own network to the Internet and were swiftly joined by other organisations, both internal and external.

The prolific growth of PCs in the workplace brought to the fore concerns over organisational usage. This was resolved with the introduction of Local and Wide Area Networks (LANs and WANs) which linked office computers together enabling them to share data, software and to facilitate general communication.

Meanwhile, interest and progress on the Internet had not waned. Whilst the PC boom continued, a British scientist, Tim Berners-Lee working for CERN (Geneva European Particle Physics Laboratory), developed the World Wide Web project in 1991. Part of this development included a primitive hypertext language which electronically tagged and linked related academic documents. This web of information was accessed, with the scientists jumping, or linking, from one document to another with relative ease. This concept generated interest on both sides of the Atlantic and it soon became apparent that a *de rigueur* standard was necessary.

The solution came in the form of the *browser* which used the idea of hypertext to quickly and easily "surf" the Net. At the time of writing, the most popular use of the Internet was electronic mail (E-Mail), allowing users to send messages, and often attached data, to computers on a global basis. CERN formally passed control of the World Wide Web over to the World Wide Web Consortium in 1994. It has been reported that the number of networks attached to the Internet was growing at a rate, according to Pennings [1997], of 15-20% per month.

2.7.2 Discussion

The growth of Information Technology, and society's increasing dependence upon it, has been both prolific and extensive. As more and more technology found, and continues to find, its way into the commercial environment, several researchers (Bessant & Cole [1985]; Boddy & Gunson [1996]; Johnston & Vitale [1988]; Laver [1989]) confirmed that organisational structures and cultures altered to reflect the changing circumstances and to exploit the competitive advantages from increased efficiency and effectiveness.

The review of computing (Section 2.7.1) has discussed how IT has assisted businesses over the years. The discussion has included historical formations of technology, the basis for its formation, the impact it has had on Mankind and the cultural and organisational impacts of the technology on Mankind.

The technical steps were documented chronologically in order to highlight the major developments that have taken place in computing. This historical perspective is useful for providing insights into the *causes* behind technical changes and also the *effects* of the changes, in organisational and commercial terms, brought about. Additionally, the question of whether these developments were as a result of direct pressure from increasingly-complex business environments, for example managers wanting more pertinent information, has been included.

New methodological and business processes have necessitated the use of new and novel ways of working. The brief review has shown that human attitudes to the new computing technology (Human Computer Interaction - HCI) was of prime importance. The position occupied by technology in organisations throughout the years has depended on the commercial aspirations of the organisation and also the industry in which the organisation operated.

The review has shown that computers have been used to facilitate and disseminate innovation in organisations. A simplistic SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis would reveal the benefits, together with relative weaknesses, of IT at each key chronological stage outlined.

2.7.3 Impact and use of Management Information Systems (MIS)

As outlined in Section 2.7.1, some of the more major evolutionary steps of Information Technology took place in the 1950s with the United States leading the global transformation from the industrial to the information age.

The acceptability however of the on-going changes was far from unanimous. A study conducted at that time by Garrity & Barnes [1968] indicated that only 9 out of 27 installations surveyed covered their initial operating costs. However, progress was being made on other aspects of the new technology and as cost, performance and potential usage of the technology improved, acceptability began to replace the initial scepticism.

What then are the benefits of IT? What are the pitfalls? This section will address these questions in regard to organisations and the role that IT plays in them. According to Schultheis & Sumner [1995], IT implementations in organisations occur for the following reasons (either individually or in combination):

- to improve **efficiency** - the execution of tasks *correctly*. Generally this refers to the automation of routine paper-based tasks. An example would be using IT to process hundreds of works orders per day.
- to improve **effectiveness** - executing the *right* tasks. Using a computer database to select likely prospects for a marketing campaign would be an example of using IT effectively.
- to bring about **transformation** - changing the *manner* in which the business is executed. By way of example, diversifying the business, via the strategic use of IT, to provide goods or services distinct to those originally provided.

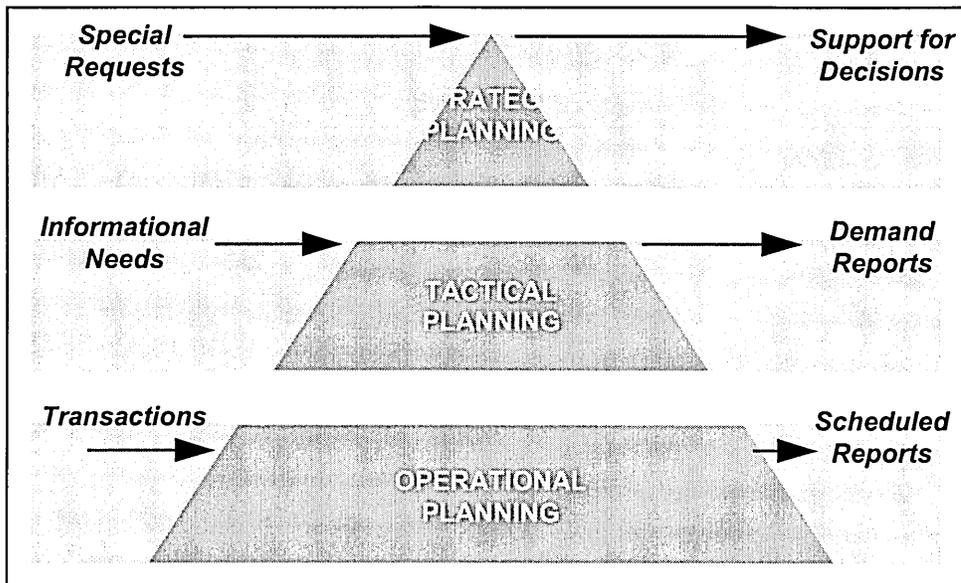


Figure 2.13: Activities and Framework for an organisation's IS requirements

Mintzberg [1989] set out to order the literature on organisational structuring and to extract its key messages and to synthesise these into an integrated picture of the structuring of organisations.

According to him, an organisation's structure consists of a highly-specialised and skilled operating core, taking the form of individuals under a professional and regulatory body, confirmed by Handy [1985].

Anthony [1965] substantiates by offering several schematics depicting the three kinds of activity of an organisation, together with the typical managerial layers and functions affected:

operational planning (the day-to-day activities of the organisation and where first-line managers collect data, results and events)

tactical planning (where operational activities are reviewed and appraised by middle-managers in order to ensure their adherence to pre-set targets and goals) and

strategic planning (usually carried out by the top-layer of management where data and information from the operational and tactical planning stages is used to set the organisation's long-term agenda).

For reasons of brevity and clarity, I have adapted and combined two of his diagrams as shown in Figure 2.13. This diagram shows the need for computer-based, pertinent, information systems that would be of strategic interest to managers, particularly in the form of Management Information Systems ('MIS').

As Schultheis & Sumner [1995] explain, the fast-moving strategies in modern organisations leading to the increasing needs of IT have clouded the area of MIS to the extent where, as Lucey [1991] says, there is:

"...no universally accepted definition of a MIS and those that exist reflect the emphasis of the particular writer"

[*ibid*, pp.1]

Despite this, Lucey [1991] attempts to put forward a definition of a Management Information System as an:

"...integrated structure of databases and information flows over all levels and components of an organisation whereby the collection, transfer and presentation of information is optimised to meet the needs of the organisation"

[*ibid*, pp.2]

whilst Long [1989] is of the opinion that a MIS is more of a:

"...system to convert data from internal and external sources into information and to communicate that information...to managers at all levels in all functions to enable them to make timely and effective decisions"

[*ibid*, pp.547]

For the purposes of this thesis, I have decided to put forward, as an acceptable definition of a MIS, the most contemporary description as given by Licker [1997] :

"...an integrated user+machine system that provides information to support operations, management analysis and decision-making functions in an organisation"

[*ibid*, pp.5]

So what role can a MIS play in an organisation? The integration of Information Technology, Management Information Systems, information flows and management is best typified by the schematic (Figure 2.14) given by Lucas [1990].

Although I would agree with all of the definitions given in this section, I would suggest that, in a commercial environment, (and for the layman), the purpose of IT for organisations is to provide the *right* information at the *right* time. The "value-chain", dividing an organisation into *value activities*, (distinct activities - such as order processing, advertising, marketing - necessary in order to carry out day-to-day business), confirms our current, and increasing, reliance on information.

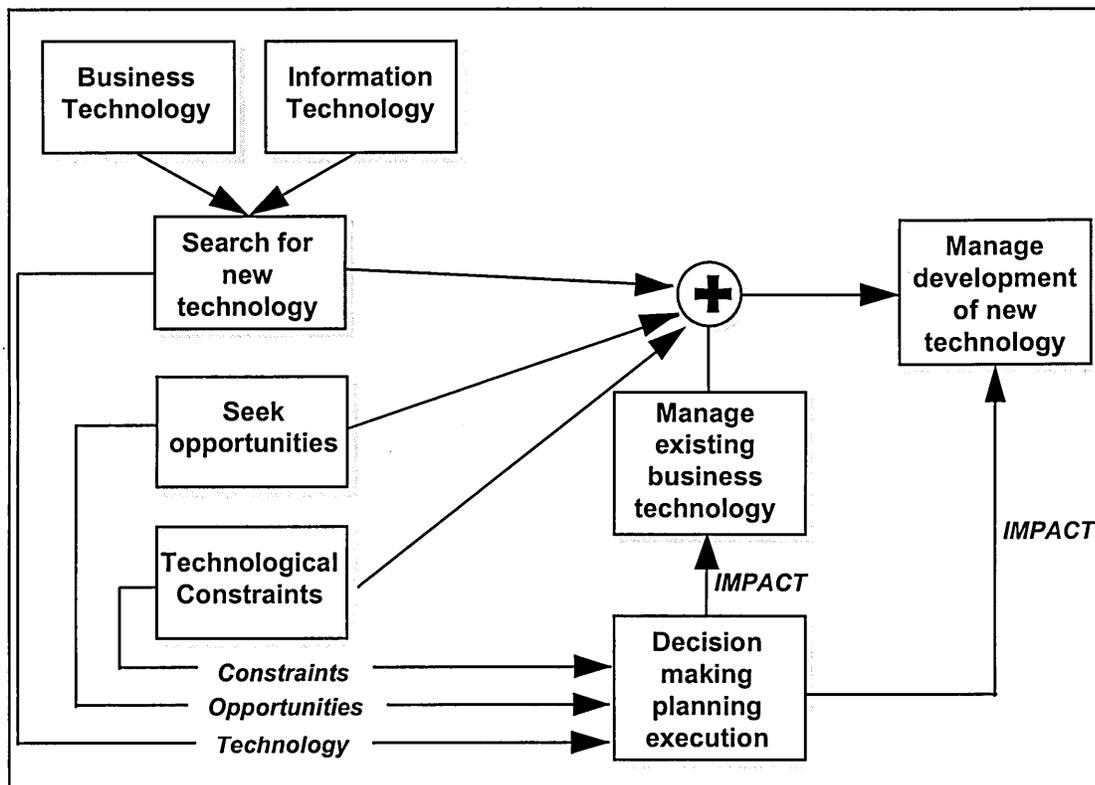


Figure 2.14: The integration of MIS and management

However, Scott-Morton [1995] reports that Information Systems only became computer-based after the accepted advent of IT systems. Before this information would have been paper-based, by the use of filing cabinets. Earl [1989] confirms the organisation-wide impact and importance of IT given the increasing importance of the

information created and used [Porter, 1985] by that organisation. This ties in with the inherent structure of the organisation in question.

2.8 Conclusions

This chapter introduced the concept of culture, organisational culture, management information and managerial structures. A historical review of researchers' interests on organisational culture and Information Technology was detailed in order to highlight the importance of the relationship between these two disciplines. Core competencies which exist within an organisation have been recognised as a key factor when attempting to change organisational culture. This chapter has revealed the following:

- The majority of the literature dealing with organisational culture has an USA-bias
- UK-based research is vital if culture-change frameworks are to be of use in the UK
- Research applying concepts of culture-change to MIS implementations is needed
- Five established researchers' findings have been analysed and can be compared and contrasted by way of a table:

FACTOR	LEWIN	SCHEIN	LUNDBERG	DYER	GAGLIARDI
Crises	Felt need for change	Leadership succession	Precipitating Pressures (Triggering Event)	Triggering Event	Experience of difficulties
Leadership	Conflict resolution	Leadership central to stages	Stable leadership team	Leader or team vital	Change of leadership
Success	Establishing culture is Implicit	Establishing culture is Explicit	Establishing culture is Implicit	Establishing culture is Explicit	Establishing culture is Explicit
Learning	Learning Process	Learning Process	Learning Cycle	Learning Cycle	Learn from Success

The information provided acts as a foundation for the proceeding chapters. Chapters 4 and 5 will examine the concept of organisational culture change when introducing Management Information Systems into firms.

3.0 Research Methodology

3.1 Introduction

Chapter 2 introduced several research issues as a result of a literature review. This chapter will use this as a basis to explain the methodologies used to investigate both the review and the research. Chapter 1 gave a synopsis of the research methodology which this chapter will substantiate. A justification of the research methodologies chosen will be given.

3.2 Methodology Selection and Justification

Regarding general research methodologies, the roles and actions of researchers have been likened to that of casting nets and testing caught specimens [Runkel, 1990]. Focussing on the mechanics of an individual case is akin to examining a specimen caught in the net (reflecting an aggregate measure of cases). The opportunities for an academic researcher to understand the complexities of a business, in terms of the mechanics of decision-making, implementation programmes and ensuing change, are few and far between because, as Gummesson [1988] puts it, *access* to suitable empirical data and information is often restricted.

I would add that an academic researcher going into an unfamiliar commercial environment would be ill-equipped in terms of institutional knowledge, such as market and industry details. In this respect, immersion, after some initial exposure to the situation, into the unfamiliar process can be beneficial. This will give the researcher the *feel* of the situation, improving observational skills and providing valuable insights into the dynamic workings of the organisation under investigation. There is a danger however that the researcher is no longer objective.

The purpose of this chapter is to provide details of the research techniques used during the investigative process. The justification for using certain methodological tools and rejecting others will be given. Additionally, information bases and sources used in the thesis will be provided.

To address the above questions, a review of various, diverse, research methodologies has been carried out, justifying their selection or rejection and identifying the extensive data and information sources necessary for the thesis. From a personal perspective, it was my intent, at the outset of the thesis, to increase my knowledge of how established and contemporary research methodological techniques can be applied to situations. Furthermore, it was my contention that this would, potentially, be an extremely marketable and useful skill that could then be transferred to a range of disciplines, including commerce and academia.

3.3 The Qualitative-Quantitative Debate

Unlike quantitative research, which deals with traditional formal methods such as surveys, statistical analysis and data modelling, qualitative research focus on activities such as interviews, participant observation, analysis of documents, with the aim of promulgating and understanding social and cultural phenomena [Stake, 1995; Leach, 1976; Spradley, 1980].

Social and cultural phenomena are increasingly important in the discipline of Information Systems ('IS') and there has been an attitude shift towards this aspect from the traditional technical bias. Qualitative research includes the researcher's own feelings and emotions in order to further understand phenomena from both a subjective and objective standpoint. It may be that many terms are used in the academic research setting which, although sometimes interchangeable, can also be used incorrectly.

Like quantitative research, qualitative research has certain assumptions regarding the epistemology [Von Wright, 1971] upon which the research is based. Qualitative research can be split [Brewer & Hunter, 1989; Taylor & Bogdan, 1984] into three categories: interpretative, positivist and critical. Whilst these categories should be epistemologically and philosophically distinct, in reality the distinction is not always clear. Work by Hussey & Hussey [1997] breaks down research, according to purpose, into one of four types: explanatory, descriptive, analytical or prescriptive.

Explanatory research is directed towards subject areas in which no, or few, previous studies have been conducted. The nature of the research looks for patterns, new ideas or hypotheses (a new proposition which can be tested against empirical data). Examples of explanatory research include case studies and observation. The nature (and name) of the research dictates that exploration is the basis of this method. Analysing a wide variety of data, investigating cultural phenomena and assessing the researcher's impressions and perspectives are an integral part of this method.

Descriptive research describes phenomena as they are. This method is used to identify and, as the name suggests, to describe issues surrounding a particular research problem. Data is often quantitative in nature and, unlike explanatory research, descriptive research describes in detail aspects and elements of the research problem.

Analytical research is essentially an extension of descriptive research. Building upon the descriptive precepts of describing characteristics, analytical research analyses and attempts to explain why and how these characteristics occur. Investigating the causal links between phenomena, identifying and controlling variables are attributes indigenous to this type of research.

Predictive research builds upon explanatory research by forecasting the outcome of similar explanatory-informed situations elsewhere. Hypothesised relationships between phenomena are generalised in order to provide a generic understanding of the research outcomes.

Additionally, the use of case-studies as a research design methodology is particularly appropriate for the thesis because, as Yin [1994] says, this assists my attempts to:

"...balance adaptiveness with rigour"

[Yin, 1994, pp.87]

as the research focusses on questions which, in my opinion, can often be reduced down to simplistic Why? and How?

Yin [1994] confirms that these type of questions are ideally-suited to qualitative case-study research. That is not to suggest that qualitative and quantitative methodologies are mutually-exclusive. Researchers from one discipline can feasibly draw on elements of another successfully. Van Maanen [1988] lists the 6 common characteristics of qualitative research as being:

- (1) *Analytical Induction* - commencing with a first hand examination of the organisation and its workings.
- (2) *Proximity* - the desire to experience actions of the research first hand.
- (3) *Ordinary Behaviour* - the research area should exhibit normal and regular behaviour.
- (4) *Descriptive emphasis* - descriptions are sought for actions in a given place or time.

- (5) *Shrinking Variance* - the emphasis being on explaining similarity and clarity.

- (6) *Consumer Enlightenment* - a major objective is to explain, without causing confusion.

Research can also be described as being *deductive* or *inductive* [Brewer & Hunter, 1989; Taylor & Bogdan, 1984; Hussey & Hussey, 1997; Burgess, 1984; Von Wright, 1971]. Deductive research is conceptualised and tested empirically by observation and has been described as moving from the general to the particular [Hussey & Hussey, 1997]. Inductive research develops theories by observing empirical realities [Hussey & Hussey, 1997]. An example of deductive research would be testing established theories in the workplace. For inductive research, work-placed observations which lead to commercial conclusions will suffice as a suitable example. In summary, in deductive research instances are deduced from inference; in inductive research, inference is induced from instances.

3.4 Organisational Observations

Observing occurrences in the workplace obviously involves a relationship between the researcher and those persons being observed. According to Burgess [1984], observational research, normally carried out by sociologists and anthropologists, breaks down into six distinct areas. Although these terms will be discussed in more detail later in this chapter, to aid clarity at this point, I will additionally provide a brief synopsis of the terms according to Burgess [1984]:

- (1) *Fieldwork* - using participant-observational methods to collect data.
- (2) *Ethnography* - using the techniques of cultural anthropology to directly observe behaviour. In this thesis, I examined the research problem for an extended period as a participant-observer, becoming an integral part of the scenario.
- (3) *Case Study* - condensing field experience using observation, review of documents and interviews.
- (4) *Qualitative Research* - using sociological techniques - such as one-to-one interviews - as a basis, qualitative research comprises in-depth interviews, participant observation and documentary evidence.
- (5) *Interpretative Procedures* - using participants' opinions and perspectives in order to gain insight into their behaviour and experiences.
- (6) *Field Research* - built on sociological and anthropological foundations, material from different perspectives is brought together in order to examine the relationship between the different methods.

Gummesson [1988] further segregates the role of the researcher into the following roles (confirmed by Stake [1995]), in which emphasis changes according to suitability:

- (1) *Researcher as a Teacher* - where the researcher learns what anticipated readers of the completed research need to know
- (2) *Researcher as an Advocate* - where data is provided to test, and argue, for and against hypotheses and assertions

- (3) *Researcher as an Evaluator* - when the researcher fairly balances a case's relative merits and demerits, presenting findings and conclusions in a fair and balanced light
- (4) *Researcher as a Biographer* - used when the researcher needs to discuss a person in depth and a historical narrative regarding this person is appropriate
- (5) *Researcher as a Theorist* - focussing on using a case's uniqueness, after not finding comparisons, the researcher concentrates on the complexity of each case and not the similarities between several cases
- (6) *Researcher as an Interpreter* - where the researcher, recognising a problem, sustains and corroborates his/her hypothesis and presents the evidence to an appropriate audience.

The importance of the role of *interpreter* is highlighted by Stake [1995] who states that most qualitative researchers support the notion that knowledge is *constructed*, rather than discovered. I would agree with this view using the various growth stages of a child as a suitable example. The formative years of a child are filled with numerous experiences, all either experienced first-hand or relayed by another person using that person's experiences. Stake [1995] further explains the idea of three types of reality:

- (1) *External Reality* - a reality with the capability to stimulate in relatively simple ways. Stake [1995] uses the example of two people observing the "moon rise", prompting a question asking whether the moon is coming up. In reality, it is the Earth that is merely moving slowly around on its axis to face the moon, whilst the moon is stationary. However the perceived notion of the moon's movements indemnifies the view that the moon is indeed "rising". These notions, when held by a number of people, are taken as gospel (especially so if some of the people are learned and respected).

- (2) *Interpreted Reality* - a reality based on the interpretations of the environment which are so persuasive and powerful that they are almost always accepted without detailed verification. The acceptance of the existence of the moon (as in the above example in *External Reality*) is confirmed by *Interpreted Reality*. According to Stake [1995], researchers corroborate this view. I would say that this is not because of any overwhelming evidence but rather because of the *lack* of any tangible proof. Stake's [1995] agreement (somewhat philosophically) points to the existence of the rationalist-constructivist view, detailing the acceptance of a perceived view because the counterclaim is considered inconceivable.

- (3) *Integrated Reality* - (also referred to as the rational reality), as the term suggests, is a union of integrated realities. It should be noted that the above definitions of interpreted and integrated realities suggest some overlap in their perception of realities.

After analysing the above suppositions, I would be tempted to view all three as being equally important. For the purposes of my research, trying to establish which is important, and which unimportant, would be wrong because, as Stake [1995] says, the aim of any research is:

"...not to discover #1, for that is impossible, but to construct a clearer reality #2 and a more sophisticated reality #3"

[Stake, 1995, pp.101].

Whilst reading Stake [1995], I was initially struck by how cerebral and intricate his extensive monologue on the existence of three types of reality really was. Sceptical at first, it was only when applying his theories (admittedly, unknowingly at first), in the form of the various case-studies, that I could fully appreciate his perception on the constructivist view.

Furthermore, I would say that I shared the commonality of views found in the case studies, that is the External Reality. Only once these were identified were further investigations carried out to explore the interpretations behind them (the Interpreted and Integrated Realities). Another researcher, given the same External Reality, may come up with Interpreted and Integrated Realities quite different to mine. The final understanding may be different, but the methodology used in order to form the conclusion will be common.

The nature of my research dictated the deployment of various and diverse research methodologies. As a Teaching Company Associate, I found myself juggling the triumvirate roles of researcher, consultant and employee. Carrying out research under the guise of a consultant is somewhat easier, compared to a pure academic researcher, as access to data and information is usually more forthcoming.

Burgess [1984], in his book *"In The Field"*, examines the problems of researching one's own environment and quotes the work of an Indian sociologist, Professor Srinivas. Srinivas identified three perspectives on this, namely that:

- (1) studying one's own environment gives the researcher a distinct advantage

- (2) writing from the perspective of a typical Indian villager, rather than as a sociological academic, allowed for more realistic and pertinent viewpoints
- (3) in-depth "insider" knowledge can affect the perspectives, and hence the outcome, of the research. For example, Srinivas' observations on the, then existent, Indian caste system were from the point of view of a *Brahmin* (the highest, considered elite, caste).

After considering this, I would agree with Leach's [1976] standpoint and would suggest that questioning the platform upon which a researcher makes a judgement can often provide great insight into the perspectives that the researcher has. If, for example, Srinivas belonged to a much lower caste, would this not have altered his perspective? If so, this may have altered his findings which may have had a consequential effect on his research.

I will elaborate using a commercially-based metaphor. Introducing radical IT-driven processes into an organisation will, arguably, result in different reactions from different members of that organisation:

- The Managing Director may have overcome his initial apprehension and now anticipates the commercial advantage the technology will bring.
- The Accounts Director may question the financial viability of the investment and may be anxious to ensure that the anticipated rate of return is met, if not surpassed.
- The Union Representative will be keen to ensure the new technology will be in his members' best interests and will not adversely effect their working life.

- The staff on the shop-floor may be fearful of the impending change, perhaps thinking that the technology will replace their jobs.

In this manner, the change programme has different effects and reactions, depending on whose perspective in the organisation you choose to analyse. Spradley [1980] describes three observational types when undertaking participant observation:

- (1) *descriptive* observations - aiming to describe the environment, its people and the events that take place
- (2) *focused* observations - analysing particular occurrences that take place at a specific place and/or time
- (3) *selective* observations - using the perspective of a person (or group of persons) to observe occurrences.

These three types, according to Spradley [1980], are inextricably linked to the varying questions asked by the participant-researcher and were used to great effect in his social studies of schools. Using his framework above, it may be beneficial to briefly outline some observational examples from his study.

For an example of *descriptive* observations, classrooms, uniforms and physical appearances are sufficient. Analysing the atmosphere in classrooms or asking what happens in the time period immediately before break-time serve as *focused* observations whilst a teacher's perspective on classes or the influence of pupil's extracurricular activities are examples of *selective* observations.

Spradley [1980] further defined nine data-collection dimensions, used as the basis for his school study. I will adapt these dimensions and, taking a more commercially-biased slant, apply them to a typical business:

- (1) *Space* - the physical layout of workshops, reception areas and hygiene facilities in the workplace.
- (2) *Actors* - major characters involved in the business, together with their names.
- (3) *Activities* - the roles and activities assumed by people in the work environment.
- (4) *Objects* - physical attributes present, including such items as desks (whether wood or metal, traditional or contemporary designs, old or new), and their layout in the office.
- (5) *Acts* - the actions of individuals (management and shop floor).
- (6) *Events* - the actions of individuals (management and shop floor) in specific situations, for example, meetings.
- (7) *Time* - the way in which the working day is split or arranged. This includes such facets as start and end-times, break times, lunch hours (or half-hours).
- (8) *Goals* - the activities that the company's staff are attempting to fulfil and the manner in which these are conducted. The differences (in terms of reaction) between, say, management and shop-floor staff is important here.
- (9) *Feelings* - how emotions are displayed or conveyed by different members of the company in varying situations.

Throughout the research, I was conscious of the fact that the work under investigation "must be right". The importance of correct research methodological techniques, both in theory and practice, and subsequent acceptance by supervisors would ensure the acceptability of the thesis. Qualitative research methodology incorporates protocols which come under the umbrella-term "triangulation".

Taylor & Bogdan [1984] regard triangulation's use and importance whenever elucidation or confirmation is sought, adhering to precepts which are based on scientific fact, and not just intuition. Triangulated measurement:

"...tries to pinpoint the values of a phenomenon more accurately by sighting in on it from different methodological viewpoints"

[Brewer & Hunter, 1989, pp.17]

To be of use, Brewer & Hunter [1989] further explain that consistent results when measuring the phenomenon are necessary. Other researchers agree (Gummesson [1988]; Stake [1995]) that when the results of two different research methodological techniques yield the same results, then the techniques are deemed to be accepted. When dissimilar results are produced, this casts doubt on the findings and indicates further work is required on the research problem.

Furthermore, for this thesis, the views and comments of established researchers, not just the academic supervisors, formed the first vertex of the research "triangle". As the research progressed, the early ethnographic fieldwork findings corroborated views of established researchers, hence indicating the acceptability of the findings at that time. A simple table, depicted by Stake [1995] and adapted below, shows the various scenarios where triangulation techniques can be successfully used.

Data Situation	Need for Triangulation
Uncontestable Description	Needs little effort towards confirmation
Dubious and Contested Description	Needs confirmation
Critical Data to an Assertion	Needs extra effort towards confirmation
Key Interpretations	Needs extra effort towards confirmation
Author's Persuasions (identified)	Needs little effort towards confirmation

Table 3.1: Triangulation Techniques -v- Scenarios

The protocols involved in triangulation techniques take many forms. Denzin [1984] identified four different types of triangulation protocol, which are listed below, along with a suitable example.

- (1) *Data Source Triangulation* - checks whether observations change when the original circumstances change. For the case studies detailed in this thesis, a suitable example would be to see whether a particular manager's attitude is dependant on the time of the working day (ie. whether (s)he becomes more receptive to colleagues at the end of the working day or week).
- (2) *Investigator Triangulation* - uses the views of other researchers to observe the original research problem. For my case-studies, actually transporting a fellow researcher to the environment may have been inconvenient (especially if my presence in the environment was already arousing suspicion) and so the next best thing was carried out: showing early written results of the case studies to suitable fellow researchers/lecturers/Academic Supervisors (in their own environment) in order to discuss the results.

This tested the academic aspects of the findings. Testing the industrial and commercial side of the findings was more difficult as locating suitable, not to mention willing, persons in the investigated firms was very difficult. The exception was the former Works and Quality Manager at Thermo-X who could corroborate the academic findings in this company's environment. I would say that trying to find suitable persons in each and every firm can actually have the reverse effect than that intended. Showing early findings may prompt objectionable feedback, particularly if the findings are considered uncomplimentary to that person, his department or the company as a whole.

- (3) *Theory Triangulation* - the views of additional researchers can be used, not just to elicit different views of the findings, but also to apply a different theoretical bent to the research. Researchers can lean towards different, often diverse methodologies. In the area of Psychology, for example, researchers can often be divided into Freudians, Jungians, Behaviourists, Reykians and the like. I would suggest that eliciting the views of researchers with varied methodological foundations may even, in layman's terms, lead to the opening of doors that would otherwise remain closed.

- (4) *Methodological Triangulation* - where observations are supported by other means of data collection, including questionnaires, interviews, seminars, group discussions, focus groups and the review of existing documents. Perceived ideas, gained through first-hand observations, can either be vindicated or contradicted by other methodological means, such as interviews or the review of documents.

Triangulation techniques support the maxim: "If it looks like a duck, walks like a duck, sounds like a duck, then it probably is a duck". Admittedly rather simplistic, I would nevertheless argue that this analogy is valid as it tests the triangulation argument in realistic terms. However, Whitely [1984] states that research carried out by a consultant is still fraught with difficulties as:

"...access is often controlled by gatekeepers who have a direct interest in the outcome"

[Whitely, 1984, pp.369].

Gummesson [1988] explains how the interrelationship between the roles of consultant and researcher (applicable also to the relationship between Associate and researcher), occurs over time and provides the following schematics to depict the relationship between the researcher and manager roles.

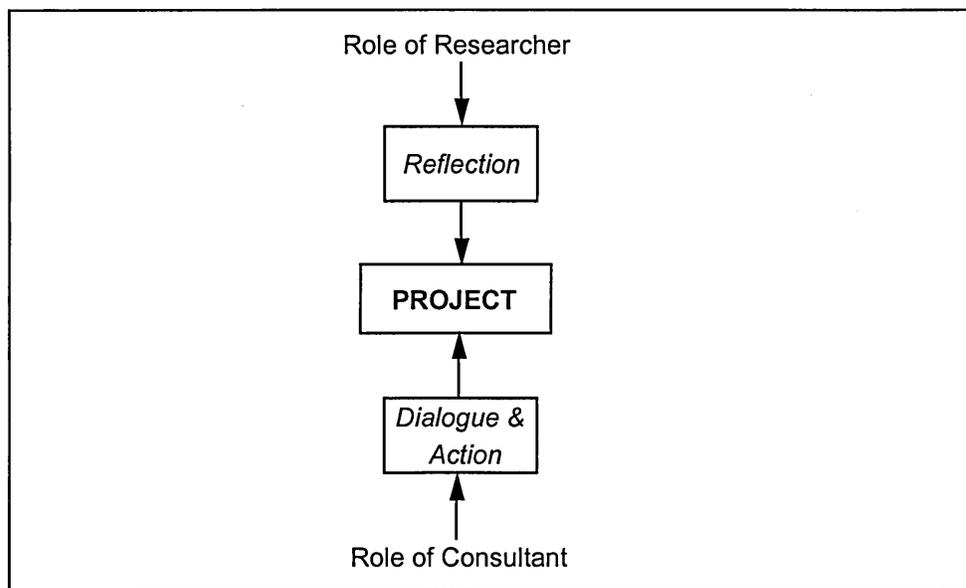


Figure 3.1: Project Relationship between Consultant and Researcher

Whilst the strategy depicted in Figure 3.1 is sufficient for an individual project, the diagram shown in Figure 3.2 would be a better schematic as it allows for the researcher to reflect on past findings, using them to his/her advantage in proceeding projects.

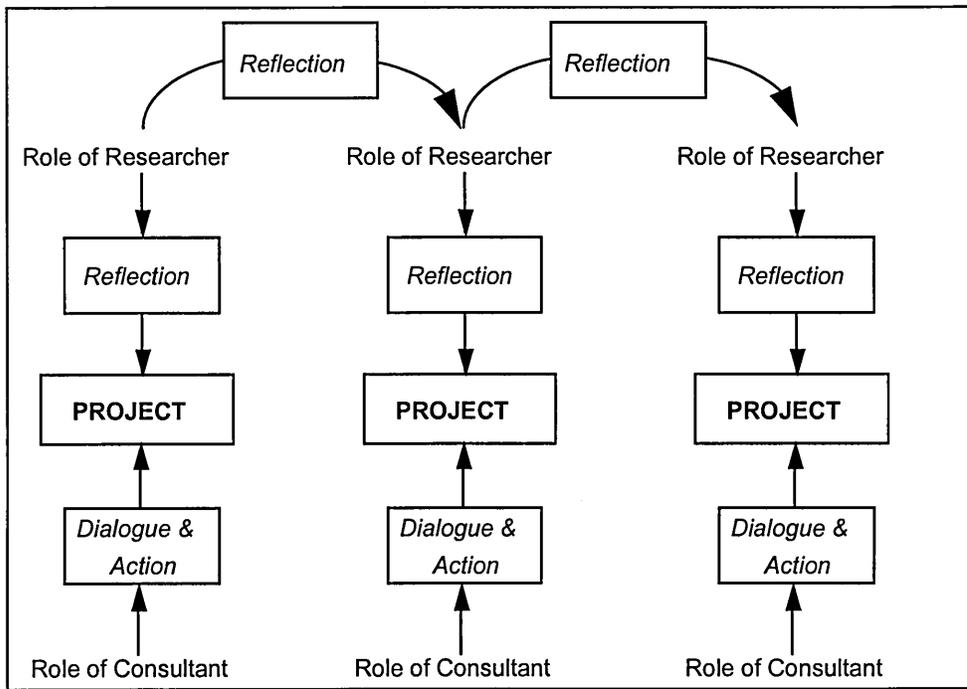


Figure 3.2: Programme Relationship between Consultant and Researcher

Breaking down a programme (which is often quite extensive) in this manner into smaller, more manageable, *projects* means that new experiences can be passed on to the subsequent projects, the researcher learning from possible past mistakes, applying new knowledge learnt and testing concepts and models formed as a result of these earlier experiences.

My approach for the thesis emulated the processes depicted in Figure 3.2 as experiences, models and concepts from earlier case studies were applied to proceeding cases, improving the validity and usefulness of these later cases.

Echoing the sentiments of Farrar [1994], I would say that a major difficulty arises when attempting to balance the twin roles of researcher and manager and the methodologies involved. Considering the polar extremes of cases is especially useful as this can often clearly depict the distinction between success and failure (adoption or rejection) of IT-based projects.

Glaser and Strauss [1967] in their book *The Discovery of Grounded Theory*, reported on the findings of an investigation into the organisation of American hospitals and coined the term "grounded theory" referring to theory which has its foundations in data. Like the case studies in this thesis, their hospital investigation was an integral part of an *inductive* framework, one which draws out conclusions from a relatively low number of cases. However, I will admit that researchers such as Turner [1988] argue that this loose interpretation of inductive is not helpful, adding that all research programmes, be they qualitative or quantitative, depend on a blend of inductive and *deductive* processes.

As discussed earlier, one of the qualitative methods used in this study was *ethnographic fieldwork*, examining the problem for an extended period as a participant-observer, becoming an integral part of the scenario in order to fully appreciate the possible ramifications and, as Marshall & Rossman [1989] put it, to be immersed in the realities of colleagues. After accompanying police officers on the beat and functioning with them on a daily basis, Van Maanen [1988] defines ethnography as a:

"...written representation of a culture or selected aspects of a culture"
[Van Maanen, 1988, pp.1].

Whilst describing fieldwork as interaction with individuals on their home ground, Van Maanen [1988] cites the work of other researchers: Agar [1980] refers to the *professional stranger*. In the same way that a Metropolitan Police Department can be investigated by the researcher undergoing police academy training (as exemplified by Van Maanen et al [1988]), accompanying police officers on the beat and functioning with officers on a daily basis, much the same methods were used during my research, particularly at Thermo-X.

These methods effectively observed the working functions of the company and were supplemented by interviews, observations and examination of company documentation, following the approach by Beynon [1973] of organisational culture examination at the Ford Motor Company. Bell [1987] points out that the ethnographic approach was originally developed by anthropologists whose interest in society and culture resulted in extensive observation and, in some cases, integration into the society under consideration. To explain further, rather than using techniques concentrating on actual data, the qualitative approach incorporates the world-perception of individuals and seeks:

"...insight rather than statistical analysis"

[Bell, 1987, pp.4]

questioning social theory, preferring instead a scientific-base on which to address questions.

Qualitative methodology is an umbrella term incorporating techniques which are subjective and are dependant on the researcher's interpretation and experiences, requiring close positioning of the researcher to the problem in hand. Qualitative studies examine problems (or phenomena) *holistically* [Schwandt, 1994] by also considering personal perceptions and interpretations to problem scenarios.

But what difference can culture make to ethnographic fieldwork? The various and varied differences in national cultural attitudes can affect ethnographic observations which may ultimately affect the outcome of the research. Agar [1986] demonstrates this using the example of the International Congress of Anthropological and Ethnological Sciences, held in New Delhi in 1978. Indian researchers accused Western researchers of constrictive methodological practices when researching life in an Indian village.

They argued that the recognition of villagers' behaviour as strictly "sacred" or "secular" did not take into account the role of religion and therefore was not representative of typical Indian life.

How then do we know whether ethnographic fieldwork has been successful? The difficulty in measuring and attributing ethnographic success is exacerbated when researchers of different disciplines are asked to observe the same situation. Agar [1985] uses the example of a study of methadone take-up of recovering heroin addicts. A Policy Analyst may record the take-up of methadone as being typical, stating that:

"Of course they use methadone; the police cracked down on heroin and the doctors put up hundreds of clinics."

[Agar, *ibid*, pp.49]

The view of a Biochemist may partly agree but have a different basis stating that:

"Of course they use methadone; they suffer from deficits in the production of endogenous opiates."

[Agar, *loc.cit.*]

A Psychologist may say that:

"Of course they use methadone; it resolves a pathology which was generated by early childhood encounters with family members."

[Agar, *loc.cit.*]

Whilst an Economist's view may be:

"Of course they use methadone; they are social casualties of the changing labour market"

[Agar, *loc.cit.*]

Which one of these views then is correct? I would argue that there is nothing inherently wrong with any of them; they are all correct according to an individual's experience, their perspective and the discipline(s) to which they subscribe. In an attempt to further validate the in-depth findings of the observed aspects of the thesis, I carried out interviews with managers from several firms in an attempt to validate and verify the ethnographically-informed data from Thermo-X.

The much quoted Von Wright [1971] states that the difference between qualitative and quantitative techniques is that of the difference between explanation and understanding. Whilst qualitative techniques attempt to *explain*, knowledge being *discovered* on a *personal* level for the researcher, quantitative methods try to *understand*, any knowledge is *constructed* (from discovered facts) and the role of the researcher is *impersonal*. Von Wright, [ibid, 1971] somewhat philosophically, suggests that:

"Understanding is also connected with *intentionality* in a way that explanation is not"

[Von Wright, 1971, pp.6]

This accepts that, almost paradoxically, explanation can aid understanding and that understanding can often be submitted in terms of explanation but that the two are epistemologically distinct (epistemological as the origin, nature and methods of "knowledge discovery" for quantitative methods is by way of case study).

My research approach also touched on elements of *phenomenology*, focussing on experiences from a subjective perspective, concentrating on a person's individual perspectives and opinions on events. These events, or phenomena, are analysed as experienced without any preconceptions.

As exemplified by Atkinson et al [1987], the phenomenological approach was originally the preserve of psychologists and includes elements termed "*humanistic*" (as they focus on those qualities that differentiate humans from animals: freedom of choice and self-direction) and "*self*" (dealing with human subjective experiences).

Carl Rogers [1951], a prominent psychologist and one of the major proponents of the phenomenological approach, states that the ideal vantage point for appreciating and analysing behaviour comes from the individual using his own perceptions and experiences as an internal frame of reference.

Turner [1988] argues that prolonged observation of an organisation can benefit by supplementing recorded interviews with a physical layout of the organisation, style and type of decor, attitudes and aptitudes of personnel and interactions on the shopfloor and in the office. This "research journal" also records the researcher's feelings, reactions and speculation of personnel. In this way, appreciation of the culture of the organisation is formed, supported by informal discussion with personnel.

Taylor & Bogdan [1984] describe *overt* observations as those which have been authorised, with *covert* operations likened to sneaking around without permission. Overt observations can be used to uncover information in an "off-the-record" situation, as will be discussed shortly. I would suggest that both have their place, bearing in mind the ethical issues involved.

Covert observations may smack of unethical behaviour but, in the interests of successful research, I would suggest that this course of action may well have the desired effect of more realistic results. Certainly at Thermo-X, there were several workers who, if they were made aware of the real reasons for questioning may have fabricated their responses in case any of the information would be relayed back to Senior Management.

Dalton [ibid, 1964] found that socialising with workers, outside of working time, can be an excellent way of collecting data. I would add that socialising with colleagues can also take place within the working day, as quick conversations (perhaps whilst passing each other in a corridor) are almost inevitable. One of the first things that I did at Thermo-X was to try to integrate as much as I could with normal day-to-day practices. It was accepted that workers would take a half-hour lunch, rather than the more conventional one hour, and then claim the additional half-hour as overtime (paid, incidentally, at the normal hourly rate). As a Teaching Company Associate, I was not entitled to claim overtime but I still decided to follow the company norm and observe a half-hour lunch.

An adjustment period took place, a period which was necessary in order for me to become accustomed to the cultural and organisational workings of the firm and also for all staff to assess the "new blood". Can we trust him? Will he be able to stick it? I discovered, in one conversation, that I had been subject to friendly "bets" between a few of the administration staff as to how long I would stay at the firm. Given the history of the programme at Thermo-X, (another Associate, my predecessor, had been forced to leave due to significant lack of progress), this situation was perhaps inevitable.

I found that integrating and socialising with colleagues became easier when there was some commonality of interest. Many of the staff, particularly those of my generation, were football-oriented and conversations and jokes regarding rival teams became commonplace. My participation in these conversations, and others perhaps concerning other interests such as cars or television programmes, helped to bring down possible "barriers" and establish a sense of *simpatico*. As time went by, I was deemed "acceptable". Personal items such as CDs and video films were often exchanged between like-minded colleagues and I was frequently asked to solve PC queries outside of the work's time.

Attending Christmas parties, providing lifts home to colleagues, being receptive to additional computer tasks (separate from the main project) and a willingness to "get stuck in", for example actively participating in the re-organisation of the Stores, were a few of the "social" activities carried out. These activities provided the opportunity to discuss problems at work in an informal and light-hearted atmosphere.

Any research questions were not normally asked in an overtly-academic manner, but rather introduced in a fashion befitting the situation. In other words, normal conversations took place with pertinent information being recorded as soon as possible. Some employees became aware of the "dual-nature" of my position (Associate and researcher) and were aware that any conversations and interchanges that took place would not be directly attributable to them. This, in itself, was quite an achievement considering the organisational culture at Thermo-X was such that employees constantly feared for their employment positions.

The ethnographic fieldwork took place at the original host firm, Thermo-X. The remaining case-studies were carried out using a basis of interviews with IT managers (or office managers) and other individuals responsible for major IT decision-making. This was coupled with short interviews with end-users and, particularly, those opposed to the new technology and its inherent organisational and cultural changes.

3.5 A Question of Ethics

Research in the organisations involved in this thesis raised ethical concerns. Should, for example, the companies involved be allowed to examine the report of their particular firm? According to Buchanan & Boddy [1982], this is a courteous and appropriate action and whilst I would agree with this, I would also argue that this would enable the management at that firm to essentially veto the findings to present the firm, and perhaps even personnel featuring in the research, in a more favourable light.

I would further agree with Bulmer [1988] who says that the right to publish findings independent to the organisation should be insisted upon. If the organisation is unwilling to agree to this, then safeguards (in the form of fictitious company names and identities) can be substituted.

I would submit that draft copies of reports should be shown to management at the organisation, if only to avert possible legal action after publication. For my research, either Teaching Company Scheme industrial supervisors or management were shown draft copies of the findings for the host organisation, Thermo-X Limited. However, this assumes that some form of approval of the proposed research project has already taken place.

When seeking permission from management to use Thermo-X as a case study, prior knowledge of that management's likely reception to the idea was sought, either by socialisation with colleagues and staff at Thermo-X, a sentiment echoed by Dalton, [1964], or by immersion into the Thermo-X company culture for a short time.

Authorisation had been obtained from senior management of Thermo-X to acknowledge their participation by name in the thesis. However, due to the amount of detail provided in the case study, and the consequent possibility of identifying individual participants, I have taken the decision to withdraw the names of both the company and staff members. The host organisation is therefore referred to by means of the pseudonym "Thermo-X Limited".

My experiences during the project period suggest that, with careful thought, ethical issues can be coped with. Whilst I would say that deliberate deceit is not an ideal course of action, it has, as Johnson [1975] says, its merits and can sometimes be an important method in gaining access to the organisation. Once the researcher has gained access, the true intentions of his presence can then be revealed. Dalton [1964] however offers the argument that deception can often facilitate access to sources and information that would otherwise remain closed, (the researcher exploiting personal contacts), and also perhaps exchanging expertise in his chosen field for professional confidence.

Whilst I would agree with this argument, I would urge caution to ensure that the researcher does not allow a conflict of interest to arise. Honesty, although not always the best policy, should always be the preferred course of action. However, in the interests of good research, I would further argue that deception may have its place, but only when significant attempts have been made to gain management acceptance.

If all parties are aware of the true intentions of the project, surely they would be understanding and thus more receptive to active participation? This, however, is not always the case. My experiences show that balancing the roles of consultant (or, in my case, Teaching Company Associate) and researcher is bound to cause ethical issues. For example, colleagues and workers may be suspicious that shop-floor data is being gathered as a semi-covert operation, the results of which will be discussed with Senior Management. Equally, management may be unreceptive to the idea of presenting their organisation's possible shortcomings in an academic environment.

The Works and Quality Manager at Thermo-X was shown early drafts of the research findings but left the organisation half-way through the study. Before leaving, we decided that, in the interests of the research, we should fictionalise the company name. It was understood that the Managing Director would not have sufficient time to support the research and would insist on the right to veto any proposals or concepts. By fictionalising the company name, I have ensured that the research is both valid and accurate whilst not revealing the true company name.

3.6 Choice of Methodology

Qualitative Research encompasses a variety of methods including ethnography, case-studies and action research. Examples of techniques which form an integral part of these methods include participant observation, interviews and, in the case of organisational research, the study of documentation and internal literature.

The nature of the research essentially directed the choice of methodology. I have employed ethnographic techniques within an inductivist framework using the phenomenological paradigm. This was supported by structured interviews at several external organisations. Within the inductivist framework, the grounded theory approach was used to induce specific data links from the host organisation.

3.7 Returning to the Research Question

As discussed in Chapter 1, the initial research related to MIS implementation in UK-based SMEs being more successful after proper appraisal, and perhaps re-engineering, of the organisational culture in force. The research framework built upon the research objectives (Chapter 1, Section 1.3), the main attributes of which were to address concerns highlighted as result of the literature review. These objectives formed the basis of the central research question:

*Can MIS success be influenced and affected by
a change in organisational culture?*

3.8 Conclusion

Many different research methodologies exist and, in this thesis, I have not adhered rigidly to any one method, preferring instead to take a "multi-method" approach, selecting from various methodologies those techniques thought to be of most benefit to the research. Any views not thought appropriate were, after due deliberation, discarded in favour of techniques from other schools.

This thesis combines good quantitative (such as semi-structured interviews) and qualitative methods (such as ethnographic techniques), used in parallel in order to investigate organisational behaviour [Daft, 1983] as researchers and managers must blend these two methodologies in order to better understand and modify the actions of an organisation [Gibson et al, 1994]. I would say that the use of a comprehensive range of methodological techniques, coupled with the already-discussed triangulation techniques, confirm my own belief that the research is both valid and correct.

4.0 Organisational Culture Change: A Case Study

4.1 Introduction

This chapter will describe an ethnographic study carried out at Thermo-X. The chapter will make extensive use of vignettes in order to present a realistic depiction of the organisation. As outlined in Chapter 1, this chapter will provide current material on the cultural, organisational and technical implications of introducing a computer-based MIS into a UK-based SME.

The findings will take account of the organisational procedures, geographical location and physical layout of the firm and will further consider the quality management and training procedures in force in order to illustrate the organisational and cultural issues within the organisation. In doing so, a holistic view of the organisational mechanics is presented.

The study focusses primarily on two areas: firstly, how the organisational culture and structure was formed, and is sustained, and secondly, how the culture and organisational procedures can be engineered in order to successfully accommodate the introduction of a computerised Management Information System.

4.2 Thermo-X Limited: A UK Small Business

This section will introduce the host organisation, will define a Small to Medium sized Enterprises ('SME') and will discuss SME organisational structures and managerial styles and techniques. The focus will then turn to the host organisation which will define the vision of the company and its attempts to re-engineer its culture for MIS implementation.

The host organisation Thermo-X Limited ('Thermo-X'), an owner-managed company based near Sheffield, is involved in the design, manufacture and calibration of thermocouples, resistance thermometers and special purpose instruments. The company can be described as a SME as it meets the legal criteria which will now be described.

4.2.1 Small to Medium sized Enterprises (SMEs)

For the purposes of this thesis, the legal definition of a UK SME, as provided by Slorach & Ellis [1998], will be used. A UK company is defined as *small* if two or more of the following criteria are met: (1) the company turnover is less than or equal to £2,800,000, (2) the balance sheet total is less than or equal to £1,400,000 and (3) the average number of employees is less than or equal to 50. A UK company is defined as *medium* if two or more of the following criteria are met: (1) the company turnover is less than or equal to £11,200,000, (2) the balance sheet total is less than or equal to £5,600,000 and (3) the average number of employees is less than or equal to 250.

According to Barrow [1998], the number of people running their own businesses in the UK has increased from 2 million in 1980 to more than 3.5 million in 1997. The launch and expansion of such a business is far from easy and good ideas, enthusiasm, skills and knowledge is not always enough. 300,000 businesses fail each year in the United Kingdom alone (many of which are in the formative period of the company). Over-optimism about the size and capability of the market is a common mistake.

4.2.2 SME Management Styles

Managing a SME has certain problems over and above those managerial problems associated with larger businesses. Central to these problems is the fact that ownership and management of SMEs is often in the hands of one person. Defining the characteristics of people who become small-business managers and owners is a difficult task. Attempts have been made by researchers, practitioners and authors such as Handy [1985], Hussey & Hussey [1997], Barrow [1998] and Slorach & Ellis [1998] who accept that some broad characteristics are typical of small-business founders: Commitment and Diligence, Acceptance of Uncertainty, Good Health, Self-discipline, Originator/Inventor characteristics and Planner/Organizer characteristics.

A 1989 study by Cranfield University, reported in Barrow [1998] found that SME managers can be grouped into four dominant types. These describe the relationship between the SME's manager and its staff, how much time the owner-manager spent on routine management tasks and what level of business skills has been attained by the SME's staff. The four types are:

- **Heroes** who spend most of their time managing the business. As the level of business skill of their employees is relatively low, heroes take the initiative to disseminate new ideas throughout the organisation. As a result, delegation of managerial tasks is possible.
- **Meddlers** who raise the level of management skill throughout the organisation but then fail to let go of relatively routine management tasks. Their experiences lead them to believe that they are better at these tasks than their subordinates. Meddlers practice "management by walking about" and delegation is rare.

- **Artisans** spend most of their time producing a product or delivering a service. The level of business skill in the company is relatively low as Artisans busy themselves helping in different departments.
- **Strategists** who equip their managers with the tools and techniques to carry out their tasks. They allow time for their key managers to think strategically. Strategists monitor performance, resolve conflict, manage change, motivate, develop staff and update core leadership and financial skills.

4.2.3 Thermo-X Management Techniques: A Sympathetic View

The application of the Cranfield study to Thermo-X, together with my own experiences at the organisation, confirm that the MD's management style emulates the "meddler" type. Reviewing each of the above styles allows us to appreciate the issues that surround the SME owner-manager (such as their motivation and aspirations) and further allows us to appreciate the *reasons* for displaying the characteristics described. We should, therefore, when describing Thermo-X's MD as a "meddler" consider both sides to the description: one from the point of view of the MD and the other from the point of view of his staff.

From the perspective of Thermo-X staff (or indeed any person external to the organisation), the MD may appear to be autocratic, demanding and critical. However, analysing further reveals the MD's perspective, one where significant work has gone into forming the business and where control of this organisation may have to be delegated to staff. We can, when considering this new perspective, therefore sympathise with the MD and his company aspirations.

Considering the role of delegation at Thermo-X illustrates both sides of the viewpoint of the "meddling" MD. Delegation would allow the MD to achieve more, permitting more time for managerial activities and providing him with a form of back-up in case of illness or emergency. Delegation allows staff to improve their skills, assume greater responsibility and empowers them to become more involved in the firm. Furthermore, the decision-making process is faster (as individuals close to the problem are making the decisions about resolving the problem) increasing the flexibility of operation (allowing more than one person to assist in functions not normally part of their job).

From the MD's point of view, he takes great pride in building up the Thermo-X operation. In the formative years of the company, he performed all business operations. As the company increased in size, the MD may well have believed that there was no competent persons to do these various jobs. Additionally, routine and familiar tasks (considered easy) may often be preferable to new processes (considered easy).

4.2.4 Thermo-X: Defining the Vision

Focussing on Thermo-X, the initial vision that prompted and justified change acted as a guide and reference point throughout the change process. The vision of the Thermo-X MD identified the major issues of change. The need for change was therefore *formalised* (the MD and I had discussed the importance of cultural change at my initial interview) and the *issues at stake* had been identified (the MD was aware that competition in the market-place necessitated organisational and cultural change).

The whole change process at Thermo-X was driven by the prospect of the impending MIS package. The new technology therefore acted as a catalyst for change. The catalysing process, as will be discussed, required constant efforts to overcome resistance, resist stagnation, fostering support to re-affirm the validity of the proposed changes.

4.2.5 Thermo-X Timeline: An Overview of Change

Given the complexity of the information to follow regarding Thermo-X and the accompanying cultural and organisational activities, it may be beneficial to preview the material. This preview or synopsis takes the form of a "timeline" which shows technical progress, cultural and organisational activities for the 30-month period.

Month	Technical Activity	Culture-Change Activity
3	<p>Start of TCS programme. Introduction to company staff and relevant facilities at the company and the University. Review of hardware (PC networks) and software (TETRA etc) in use. Requirements Specification for new system (after SSADM analysis). Word templates set up. <i>TCS Induction course (Module 1).</i></p>	<p>Need for culture change established and agreed between MD, WQ Manager, Industrial Supervisor(s) and I. Personal presence established at company / "open-door" policy. Need for incremental implementation approach confirmed. Microsoft Word mentoring. <i>Diagnostic Activity:</i> Going around to each employee in turn, carrying out a brief, informal, interview. <i>Village Hall meeting:</i> Introduction to staff (reps etc) and overview of my tasks. ACTION: Self INVOLVEMENT: All staff, all functions TOTAL NUMBERS: 31 persons</p>
6	<p>Stores reorganisation. Discussion of IT Pilot Scheme for TETRA. Mini-Project: "The Prototyping of an Electronic Catalogue". <i>TCS Induction course (Module 2).</i></p>	<p>"Hands-on" commitment demonstrated to company. IT functionality demonstrated to colleagues. <i>Village Hall meeting:</i> Demonstration of mini project to staff. ACTION: Self INVOLVEMENT: Academic Staff, MD, WQ Manager, Sales Reps, Foreman, Storeman, Receptionists, Sales Order clerk, Purchase Order Clerk, Accounts staff TOTAL NUMBERS: 17 persons</p>

- 9 Investigation for company email/internet access. Overseeing data entry into TETRA. Short-form user guides designed for TETRA. Purchase of new server, Installation of network cabling infrastructure.
- IT Pilot Scheme (TETRA) set up. TETRA training. TETRA mentoring. Team-building and process consultation with key users (accounts, despatch, sales, purchase). Usefulness of email/internet technologies conveyed to staff.
Village Hall meeting: Dissemination of first-phase proposed product code structure to staff.
ACTION: Self, Network agency, contractors
INVOLVEMENT: Academic Staff, MD, WQ Manager, Sales Reps, Sales Order clerk, Purchase Order Clerk, Foreman, Storeman, Receptionists, Service Manager, Calibration Manager, Accounts staff
TOTAL NUMBERS: 20 persons
- 12 Email and Internet Access arranged. Software installed and accompanying procedures written.
- Village Hall meeting:* Usefulness of contemporary techniques conveyed to staff. Email and internet mentoring.
ACTION: Self, Local TEC
INVOLVEMENT: TEC staff, WQ Manager, MD, Sales Reps, Receptionists, Accounts staff
TOTAL NUMBERS: 17 persons
- 15 Purchase of new DTP hardware and software (PC, scanner, A3 colour printer). Design of several catalogue pages and technical leaflets. Discussion of new MIS package requirements.
- Village Hall meeting:* Dissemination and discussion of prototype catalogue pages. Team-building and process consultation with key users (sales reps). Discussion of new requirements re. catalogue and technical specification sheets.
ACTION: Self
INVOLVEMENT: MD, WQ Manager, Sales Reps, Purchase Order clerk, Sales Order clerk, Receptionists, Storeman, Foreman, Welders, Works Inspection, Service Manager, Service staff, Calibration Manager, Accounts staff
TOTAL NUMBERS: 25 persons

- 18 Design and production of new catalogue pages. Research and review of MIS packages. Demonstrations carried out and costings discussed. Final selection of SAGE package. *TCS Induction course (Module 3)*. Discussion of new IT Pilot Scheme for SAGE MIS.
- Village Hall meeting:* Dissemination and discussion of prototype catalogue pages. IT Pilot Schemes set up. Team-building and process consultation with key users (accounts, despatch, sales, purchase).
ACTION: Self
INVOLVEMENT: MD, WQ Manager, Sales Reps, Purchase Order clerk, Sales Order clerk, Receptionists, Storeman, Foreman, Welders, Works Inspection, Service Manager, Service staff, Calibration Manager, Accounts staff
TOTAL NUMBERS: 25 persons
- 21 Installation of new network infrastructure (hub, server, ports and cabling). Merging of previous Thermo-X networks. Definition of SAGE training required. Implementation Schedule agreed with company and software vendor. Design and implementation of computer-based calibration reminder system. *TCS Induction course (Module 4)*.
- Discussion of new training plan with management and accounts. Team-building and process consultation with key users (accounts, despatch, purchase, sales).
ACTION: Self, Network and software companies, contractors
INVOLVEMENT: Academic staff, MD, Sales Reps, Purchase Order clerk, Sales Order clerk, Receptionists, Storeman, Foreman, Welders, Works Inspection, Service Manager, Service staff, Calibration Manager, Accounts staff
TOTAL NUMBERS: 22 persons
- 24 Design and implementation of computer-based diary. Design and implementation of computer-based price lists.
- Diary mentoring. Facilitating understanding and use of price lists. Price-list mentoring.
ACTION: Self
INVOLVEMENT: Academic staff and most company staff (except shopfloor)
TOTAL NUMBERS: 17 persons
- 27 Full implementation of Sage MIS, all functions. Continued investigation into implementation of third-party MRP solution.
- Facilitating understanding and use of SAGE. SAGE mentoring.
ACTION: Self, SAGE vendor
INVOLVEMENT: All staff except shopfloor staff
TOTAL NUMBERS: 21 persons

30 Final system handover. End of TCS programme.

Facilitating understanding and use of SAGE. SAGE mentoring.
ACTION: Self, SAGE vendor
INVOLVEMENT: All staff except shopfloor staff, Academic staff, MD, Sales Reps, Purchase Order clerk, Sales Order clerk, Receptionists, Storeman, Foreman, Welders, Works Inspection, Service Manager, Service staff, Calibration Manager, Accounts staff
TOTAL NUMBERS: 21 persons

Table 4.1: Thermo-X Timeline

4.3 Thermo-X Limited: Inside the Organisation

Due to the amount of detail provided in the case study, and the consequent possibility of identifying individual participants, I have taken the decision to withhold the names of both the company and staff members. The host organisation is therefore referred to by means of the pseudonym "Thermo-X Limited".

The data for the research at Thermo-X was collected over a thirty month period of a Teaching Company Scheme ('TCS') programme in conjunction with Sheffield Hallam University. All observations were carried out whilst working the same days and hours as a typical Thermo-X employee (a 5 day, 40-hour week). Observations and interviews fell into one of two broad categories: *ethnographic*, involving employees having fewer than 2 years experience at Thermo-X who were able to provide initial and current information on the organisation, and *historical*, for those employees with more than 2 years experience who were in a position to provide more in-depth perceptions and experiences of the organisation.

Questions and discussions were centred around the core perspectives of management-employee relations, business atmosphere, management goals, internal systems, and relationships with suppliers and customers. Analysis of organisational documents provided additional, valuable sources of data. The documents included such literature as quality manuals, mission statements, annual themes, training documents, memos, postings on notice-boards, personnel manuals and several other miscellaneous documents, all of which combine to present a realistic cultural and organisational perspective of the company.

Although the vast majority of Thermo-X's products have a low unit cost, the products are, more often than not, failure-critical in industrial process plant applications such as furnaces. Furnaces and other industrial plant often have enormous downtime costs, thereby necessitating very short delivery times for failure-critical operational appliances. In order to respond quickly to customer demands, and because of the large variety in product range (over 4000 separate items on offer), Thermo-X keeps relatively high levels of stock (currently 20% of turnover). Offering a fast and flexible service is therefore of paramount importance.

Originally formed in 1979 by the current owner and Managing Director ('MD'), the firm changed its name in 1994 when it acquired a small competitor firm. The MD's decision to merge these two companies to form Thermo-X Limited was logical as accreditation in both ISO9000 and NAMAS (National Measurement Accreditation Service) had been achieved at the Sheffield site. The management structure in March 1996 can be depicted as follows:

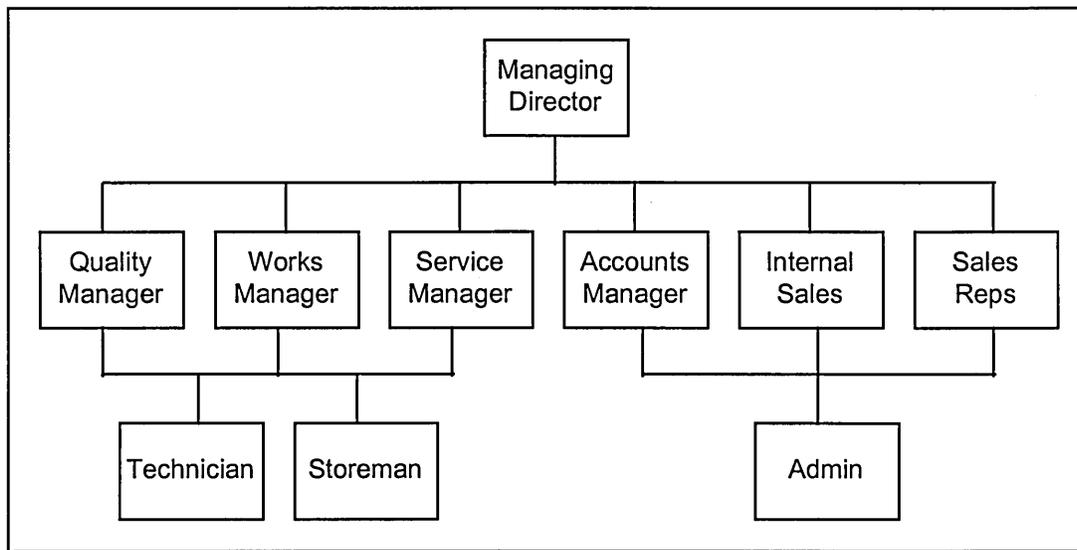


Figure 4.1: Management Structure, Thermo-X Limited, March 1996

The MD's vision at that time included taking Thermo-X into new markets, expanding the product range and offering partnerships with suppliers and customers to increase turnover and profitability. Shorter-term objectives included the promotion of quality precepts and the value and importance of traceability as a concept whilst increasing accuracy capability in respect of thermal and electrical measurements.

Thermo-X possesses a satellite sales office in the West Midlands (employing 2 people) and, in 1996, acquired a specialist calibration site in South Yorkshire. Early in 1998 Thermo-X, for financial and operational reasons, took the decision to close down the South Yorkshire laboratory and move the facility to a new site in Derbyshire.

At the time of writing, Thermo-X employs 30 staff. I was employed as part of the Teaching Company programme on which I commenced in March 1996. The primary objectives of the programme for Thermo-X were the improvement of manufacturing performance by the introduction of stock-control systems and software, the possible introduction of manufacturing resource planning (MRPII) software and techniques combined with the general improvement of existing operational procedures and management control mechanisms. Secondary objectives, and almost an integral part of the primary aims, were the introduction and demonstration of contemporary IT methods and techniques for business support.

At the time of writing, turnover is £1 million per annum with gross profits around 20%. The inventory levels remain high at £200,000. This is mainly due for the need to keep relatively large stocks of raw material in order to respond quickly to customer demands. The company has less than 10% of the UK market share with a small amount of turnover from export to Turkey and Belgium. The increase is anticipated in equal fractions from the sensor products and the calibration service.

4.3.1 Geographical and Physical Layout

The Thermo-X Head Office is based in a small two-building, two-storey site approximately 20 miles from Sheffield City Centre. The location of the business has meant that, geographically and historically, Thermo-X has taken advantage of Sheffield's traditional industry-trained labour who, because of the rural location, have been obliged to take employment at lower hourly rates than they might expect in the city. The expertise is based upon original services to steel-making industries found in the Sheffield area.

Many of the employees are older, time-served engineers who have valuable and substantial experience to pass onto younger employees. In this regard their experiences have been advantageous; conversely, their experiences have also been disadvantageous if they have been accustomed to working in firms where managerial attitudes were different to those at Thermo-X.

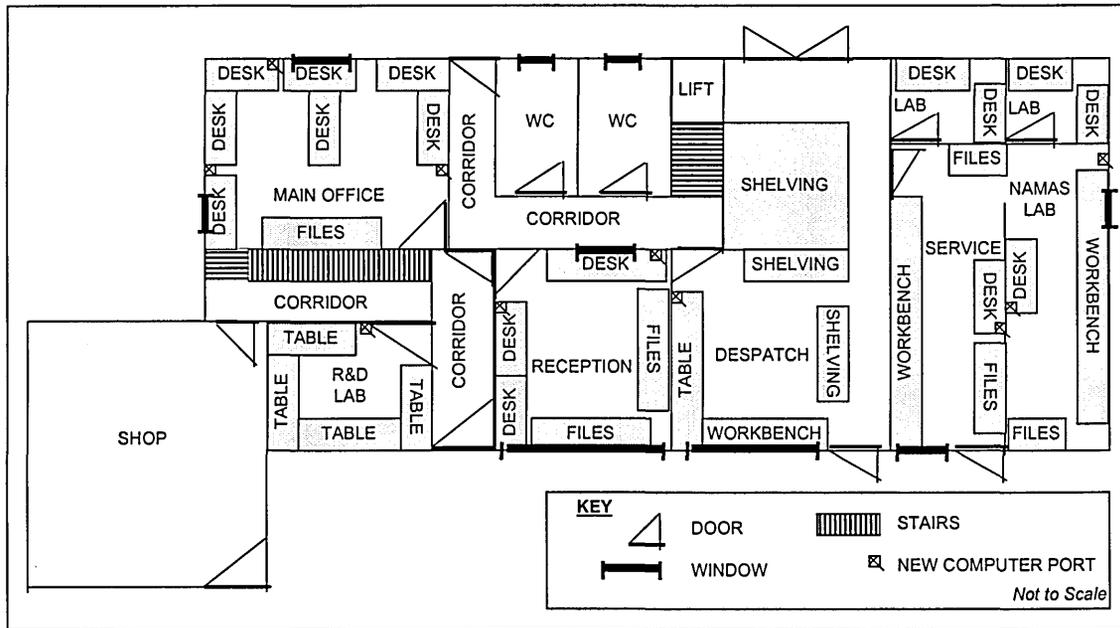


Figure 4.2: Thermo-X layout: Building 1, Level 1

The Thermo-X building (shown in Figure 4.2) begins with a small entrance foyer which also acts as a "standing room only" waiting area. To the left of this area is a small corridor which leads to a small laboratory, the rear entrance of the gift shop and a staircase leading to the Accounts Office, the MD's office, an office shared by the Teaching Company Associate with the Accounts Assistant, a refectory area and a rear entrance to the Company Stores (as depicted in figure 4.3).

To the front of the reception area is a door leading to the main office and to the right is a hatch-style window encasing the reception staff and main secretarial area. Going through the front reception door reveals the Main Office on the left, a corridor immediately to the front (which leads to the rear entrance of the building and a yard-cum-parking-area leading to the Workshop). Depicted in figure 4.2, to the right is the main entrance to the Company Stores and a door leading to the Despatch Area (which is also accessible from the front and rear of the building).

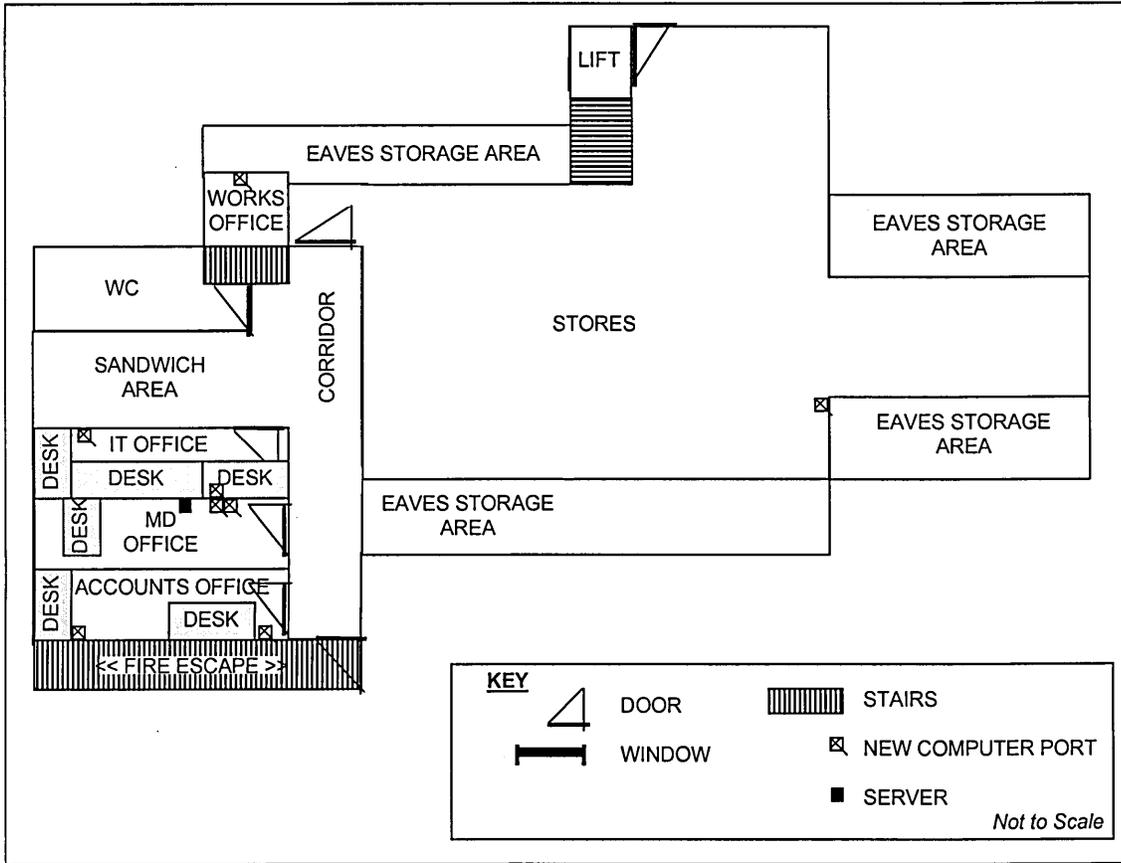


Figure 4.3: Thermo-X layout: Building 1, Level 2

Going through the Despatch Area, containing a variety of Quality-labelled shelves, leads to the Service Department which also houses two partitioned Calibration Laboratories (figure 4.2).

Walking across the rear yard leads to the two-storey workshop (figure 4.4). The entrance to the workshop reveals a small welding area on the right and a long workbench on the left. The main floor area is taken up with lathes, milling machines and turning equipment. Bearing left leads to a staircase leading to the second storey of the workshop. Opening the door at the top of the stairs allows entry to the second floor of the building. This floor houses additional workbenches, primarily used to assemble thermocouples and other temperature-measurement equipment.

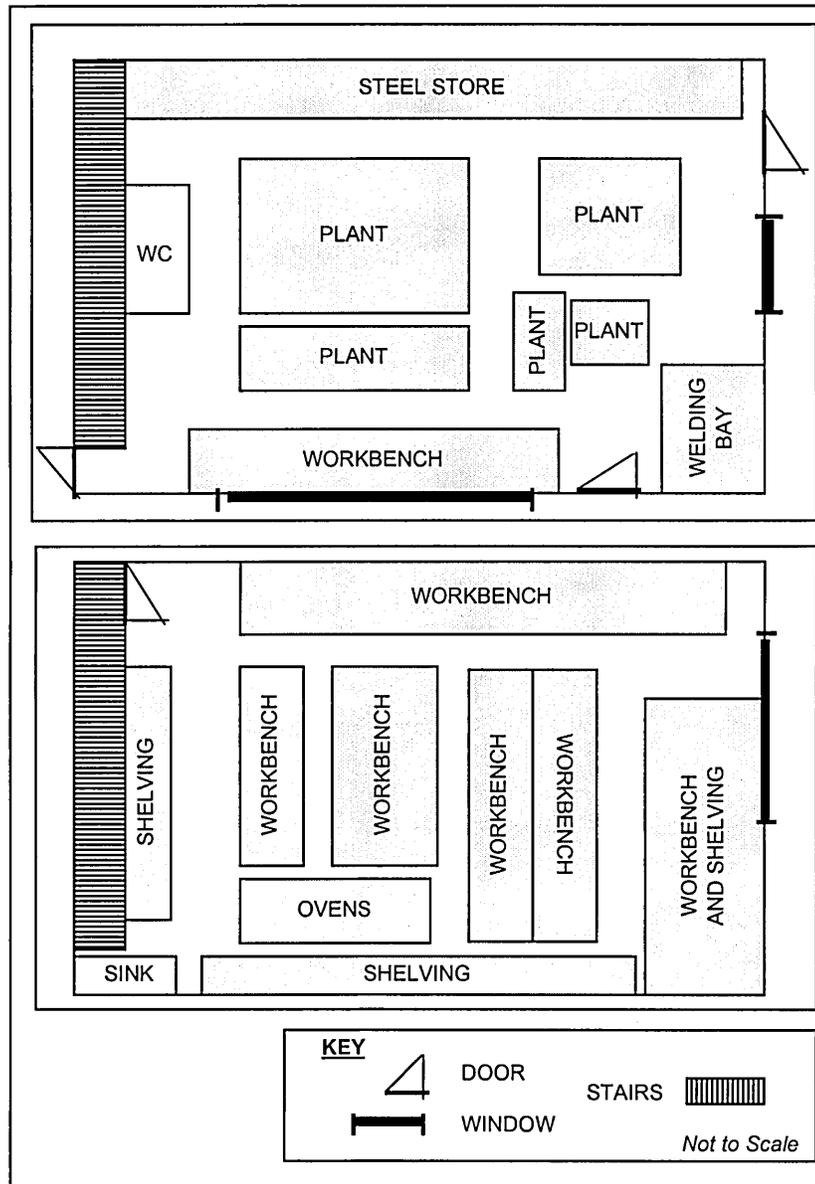


Figure 4.4: Thermo-X layout: Building 2, Levels 1 and 2

4.3.2 IT and IS Environment

Prior to my appointment and the implementation of the new MIS (discussed later in this chapter), the computer hardware consisted of several antiquated Personal Computers ('PC') running on a variety of disparate networks. There were also a number of stand-alone PCs located around the buildings. The software package, TETRA 2000 ('TETRA') is an old, DOS-based, Accounts-oriented package created in the 1970s. The TETRA package has been operated by Thermo-X since 1984. Additional programs (not related to TETRA) are used by several departments, including Accounts and Service. These packages (often databases) are also DOS-based.

NETWORK OPERATING SYSTEM

Thermo-X used three different, unconnected, networks. The first, 9-Tiles, is a peer-to-peer network running the TETRA Accounts software on three PCs and incorporates processes such as Sales Order Processing and the Purchase Ledger. The second, Little Big Lan, also a peer-to-peer network, runs DOS-based word-processing software and another version of TETRA for use in the Service and Calibration departments. The third, again using Little Big Lan, runs the DOS-based word-processing packages in Reception. The spread of networks and the manual data transfer between them is depicted in Figure 4.5.

IT DEVELOPMENT AND ACQUISITION

IT acquisitions at Thermo-X have always been based on the recommendations of various IT-literate employees. The level of literacy has varied according to the person employed and, as each employee left the organisation, new IT purchases have been made on the recommendations of the incoming employee.

This constant cycle of IT purchases has culminated in loss of enthusiasm and commitment by the MD. Prior to my appointment, there was no overall IT strategy. Co-ordination of IT requirements had been developed almost on an ad-hoc basis, purchasing products and services as and when required. As a consequence, the impetus for IT implementation and improvement has decreased with the departure and subsequent hiring of IT staff.

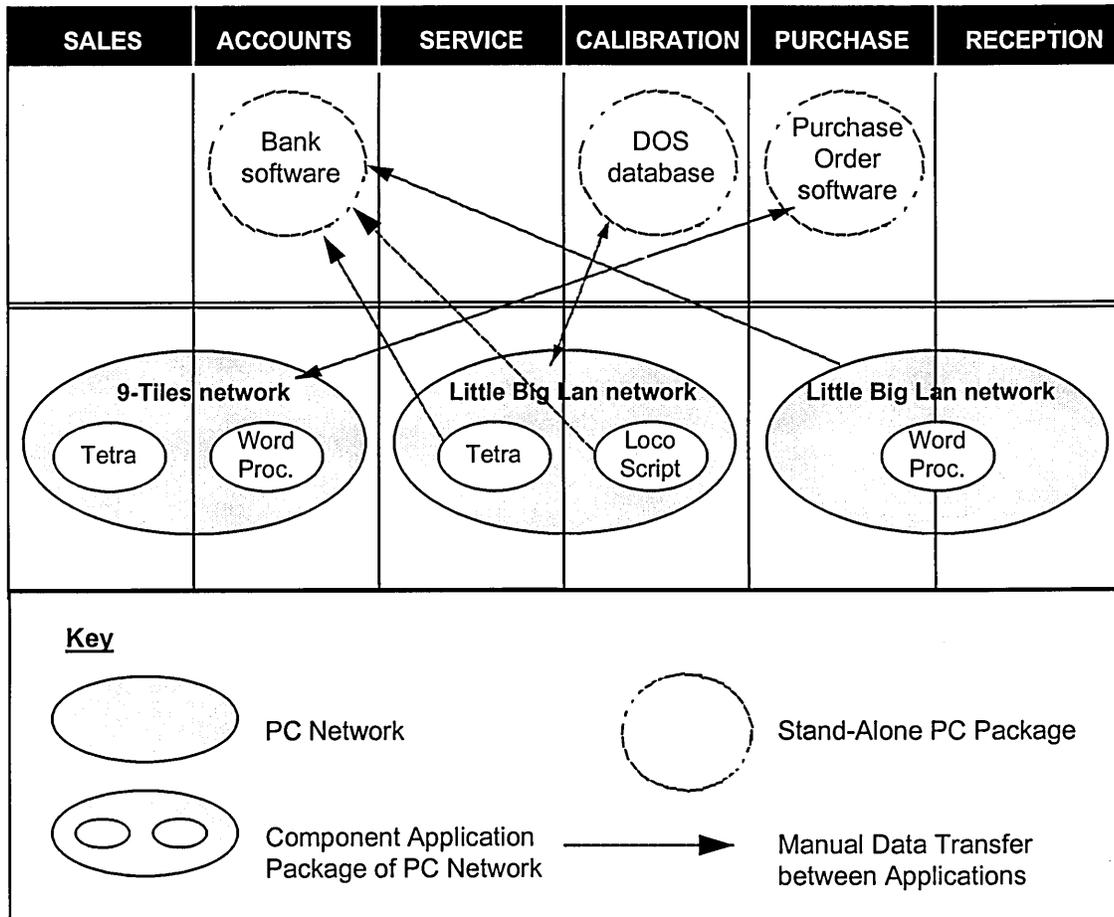


Figure 4.5: Legacy systems at Thermo-X

USER TRAINING AND ATTITUDES

No recognised training had previously ever been organised to supplement IT implementations. User-training had always been self-taught allowing room for error and incorrect and inefficient techniques have become commonplace.

User efficiency and enthusiasm has generally been dependant on the user's prior knowledge of IT. Several stand-alone packages (such as LocoScript and Wordstar) have either been purchased or developed in-house using out-dated technology and languages. The training for these packages has also been minimal.

DATA STORAGE AND INTEGRITY

The need to manually transfer data meant that data integrity errors often occurred. Updating certain parts of the Accounts package without updating others caused several hours work rectifying the mistakes. Additionally, inadequate methods of IT management meant that backups of data, and of the original application package, had been poorly controlled. Several attempts had been made by departmental personnel to resolve problems which had occurred without reference to the "IT Manager". Such attempts increased the likelihood of data integrity errors.

TRANSFERRING DATA

Storage of data on disparate networks and the need to re-type data manually from one system to another were not only time-consuming but also resulted in several discrepancies. Data, such as supplier details and purchase ledger details needed re-typing between the stand-alone purchase order system (Windows-based software) to the networked TETRA package (DOS-based software). The risk of duplication, errors when re-typing and issues regarding validation and verification all contributed to inefficient techniques for data transfer. When time was of the essence, some users did not refer to original print-outs due for transfer and instead took guesses, increasing the risk of possessing out-dated data.

SYSTEM MAINTENANCE

Several in-house applications were developed by personnel who have since left the company. Only one "IT-literate" member of the organisation (who has been present since 1984) has witnessed all of the various IT and IS implementations. As such, acquaintance with the detail and structure of such legacy systems has rested with this one individual. His technical knowledge is based on a "trial and error" methodology rather than being based on any formalised IT training techniques. Little documentation exists to support these applications and any available guides and instructions may themselves be out-dated.

4.3.3 Sales Order and Works Order Processing

Jobs fall into one of five categories: manufacture, service, instrument repair, sensor repair and calibration. Some of these jobs may require an element of design work, others can be manufactured or serviced effectively in-house. The remainder are bought-in items which are then resold to the customer.

In the main office, telephoned and faxed orders are placed in a tray which is periodically emptied and sent to relevant departments (manufacturing, service or calibration). A paper-based chart, acting as a basic scheduling system, was originally in this office and allowed all Sales Personnel to quote accurate lead times according to spare capacity as marked on the matrix. This chart system was moved to a small office in the company stores to ease physical congestion in the main office. Transferring the system to the stores office meant that the MD has been able to access the chart easily (as the store's office is a short walk from his office) and also means that the MD can have input into the commencement dates of incoming manufacturing jobs.

This leads us to the first organisational problem which concerns job scheduling. As the MD understandably does not want to turn away potentially lucrative jobs, all customer requirements are accepted. Quite often, unrealistic lead times and delivery dates had been quoted by the MD and sales staff. The paper chart prevented this scenario of unrealistic lead-times as an instant check could be carried out by sales staff and the MD showing progress of jobs-in-hand. The chart depicted if and when new jobs could be taken on. Errors were only brought to the company's attention when customers enquired as to the progress of their order or if an internal quality audit was carried out (monthly by the quality manager).

Another difficulty concerned job-costing and pricing. The MD has extensive experience in the temperature measurement industry and, as a result, feels able to regularly overrule the prices quoted by his colleagues, including the Works and Quality Manager ('WQ Manager'). The MD understands the market so intimately that he is able to quote a unique price for every job; this is not the case for other staff. When these colleagues used his pricing methods on their own customers, they were then scolded for not charging enough. Over lunch, after witnessing one of these scoldings, the former WQ Manager commented that:

"...despite all of our experience in this firm, no one can do anything off their own backs. We seem to be running too tight a ship, there's no autonomy, no freedom, no *input* from anyone else".

Another problem over job-costing concerned the absence of a formal price-list, a problem which has recently been rectified (June 1998). Prior to the new computer-based price-list, accessible over the new computer network (described later in the chapter), prices and profit margins were solely the domain of the MD. His rare holidays or even rarer sick days caused havoc in the firm as no-one was then available to accurately price jobs.

If a job is taken with a low profit margin, the customer readily accepts. Unfortunately, the same customer is less willing to accept next time they ask for a quote and find that the MD has doubled the price. As a result, Thermo-X may lose the customer.

During the course of my observations, several senior staff members left, vacating several positions which either had to be filled by new, inexperienced, personnel or by a redeployment of existing staff either on a temporary or permanent basis. The Sales Clerk had been replaced four times (one experienced person lasting just a day). In the intervening periods, the MD took the decision to redeploy Sales Reps to the office-based sales position on a cyclical basis. This was not a popular decision for the Reps. On hearing the news of the decision, one of the Reps commented:

"I'm supposed to be a Rep. Because of all the changes [as three Sales Clerks had left the company], I'm the one that gets the call to come and cover. It needs doing obviously, but am I really the right person? I can't do any Repping which means I don't get paid [any commissions]. It was supposed to be a short term thing but I've been here for weeks now. If I could get another job, I would. I've tried, but who wants me at my age [55]?"

Returning to the problems of job-scheduling, when any scheduling problems were highlighted, the MD would regularly chastise and berate employees, often in the company of their colleagues and subordinates. These actions combined to form a "blame" culture, where the level and intensity of blame varied with the attitude of the MD at any given time. Paradoxically, the MD was often the prime instigator of these problems as he would regularly accept jobs without checking the capacity of the workshop or, worse still, would accept jobs and then not place them in the pending tray. The MD would then proceed to explain, at great length, how:

"Too much time and effort has gone into creating a system and no-one, and I mean no-one, is going to circumvent it".

Stepping back from my position as a participant-observer led me to conclude that this may be the nature of a small business: the acceptance of any jobs, in order to meet monthly outgoings, is surely a practice adopted by many businesses. The majority of Thermo-X's orders involved a short lead-time (normally less than a week). Many of the products are, more often than not, failure-critical in industrial process plant applications such as furnaces.

Another interesting observation involves the restructuring of a planned job in-progress in favour of a new, smaller, but more profitable order from a large German car manufacturer. The skills required for this job required the presence of staff, who normally work a 5-day week - on a weekend shift - in order to meet the order's delivery time. Having displayed to the customer the fast turn-around of the order, the motivation was to attract the customer back to the Thermo-X for their larger orders.

4.3.4 The Quality Perspective

The appointment of the former Works and Quality Manager ('WQ Manager'), a member of the Institute of Quality Assurance, in 1994 led to a tightening of procedures. The timing of the ISO9002 implementation in 1994 coincided with the launch of the new, incorporated, Thermo-X company and NAMAS accreditation. ISO9002 formed part of the quality and traceability theme and helped structure systems.

In Thermo-X's experience, a number of customers have remained loyal to the organisation and have placed profitable contract orders. The term "as previously supplied" has often been used on purchase orders and experienced Thermo-X employees have tended to respond automatically to such orders and not probed customers further regarding their requirements.

The WQ Manager says that this type of customer relationship can bring about proportionately little information regarding product specification and documented records. This has traceability implications for future QA inspections.

Prior to my appointment, the ISO9002 quality system was to form the basis and framework for changing Thermo-X's organisational structure. The WQ Manager's attempts to change the structure by way of a "framework for change" (as illustrated in Table 4.2). This framework was developed by the WQ Manager in conjunction with an external QA agency. The ISO9002 system has permitted such benefits as removing the onus of product specification and material control away from employees.

Organising	Systems & Techniques	Measurement & Feedback	Changing The Culture
Long term strategy for quality improvement formulated and integrated with business plans Quality Improvement Plans developed	Identification of applicable tools and techniques at each stage of quality improvement	Key internal and external performance measures identified, defined and developed	Assess the current status of organisational culture before developing plans for change
Definition of quality, TQM and quality improvement developed and agreed	Training in the use of tools and techniques, for the right people at the right time	Ongoing discussions with customers about expected performance	Recognition of the ongoing nature of culture change, but the need to outline specific changes
Identification of sources of advice	Use of a formal Quality System	Benchmarking, once quality improvement is underway	Plan change consistently and incrementally
Choice of approach to TQM	Identification of other systems and standards that may be required by customers or legislation	Means for celebration and communication of success and teamwork developed	Recognise the role of people as an asset
Stages of improvement activity identified	Identification of key Business Processes and improvement based on these processes	Consideration of the link between results from quality improvement and rewards	Consider the Inter-relationships of all activities within the organisation in order to minimise conflict

Executive Leadership and commitment to quality improvement

Means of assessing the progress towards world class performance considered e.g. EQA or Baldrige

Identify factors which indicate that culture is changing.

Vision and mission Statements should be developed and communicated

Consider the national and local culture

Methods of communication decided upon

Formal programme of education and training

Organisational Infrastructure established to facilitate local ownership of quality improvement

Teamwork established as a way of working and part of the infrastructure

Table 4.2: The Thermo-X Framework for Change, 1996

The introduction of the ISO9002 system has allowed the organisation to extract knowledge and record details which have enabled new employees to better understand the purchase and sales systems. During lengthy discussions with the WQ Manager, it emerged that the adoption of the ISO9002 standard was never intended to "restrict" Thermo-X by imposing a radically-different new system. ISO9002 was to be used as a guidance mechanism and as an aid to build improvement programmes.

The WQ Manager confirmed that the ISO9002 standard has been a useful tool for Thermo-X as it has facilitated the process of extracting information from organisational members and has prevented "possessive" ownership of operations and data. Extracting such information and empowerment has been important to meet the company's ambitions for growth and to recruit new employees. Such an approach has been vitally important as the company was serious about culture change, which was crucial if the systems and processes were to become efficient and the company more profitable.

The WQ Manager says that the ISO9002 standard has played its part in persuading a hesitant MD that systemisation was necessary and that documentation does not necessarily mean job creation. It has proved its worth in terms of monitoring performance, highlighting trends and instigating efficiency changes. By way of example, a format for reviewing employee training needs has been established. Recognising this important feature has been a crucial step forward. By establishing training needs, particularly those of management, the company may show signs of improvement. This commitment also demonstrates a positive attitude to employees, and has set the standard for the long-term development of the organisation.

The company continues to work on a programme of updating systems and meeting the needs of its customers. The partnerships and support given by external organisations (such as TECs and Business Link) will continue to support the programme of change. That change has to be slow but never stand still. These incremental steps forward should demonstrate a commitment to improving the working environment and conditions of every employee. There is an important role to be played by UKAS (United Kingdom Accreditation Service) and quality professionals in promoting the values of accreditation and recognising what that commitment entails.

The WQ Manager relates how the journey so far has highlighted the "multi-task" role of managers in small companies who have daily responsibilities for a number of activities. Such a "hands-on" approach, combined with limited financial authority and dual responsibility, has not always lent itself naturally to time allocation for planning and reviewing performance data.

As part of the ISO9002 initiative, the introduction of Quality Inspections, Quarantine shelves, Quality Manuals and Quality Circles seemed to be working. However, the impetus and interest slowly waned, whether by lack of interest of the participants, lack of time by the Quality Manager or a combination of the two. Whilst the Quality system has certainly tightened procedures, the MD is still not wholly convinced of its merits and is concerned with the vast amounts of paperwork produced. As he has often stated:

"This organisation is being swamped by paperwork. Five bits of paper floating around and we still get it wrong".

However the WQ Manager insists that the paperwork system is a valid technique to use and responded to the MD's comments, saying that:

"...the advantage is not in the bits of paper - however many there are. What's *written* on them, that's what counts".

To ensure adherence to quality procedures, mandatory internal and external audits as part of the ISO9002 accreditation take place periodically giving Thermo-X the opportunity to ensure that all paperwork and procedures are tidied up in readiness for the Inspectors.

The quality system has been designed to ensure that all incoming goods are placed on a shelf awaiting inspection, normally by the Storeman. This practice was generally acceptable but recently several employees, particularly in the Service department, spot necessary items on the shelf and, in order to complete a part-complete finished good, simply take components without informing the Storeman. This obviously bypasses the Quality Procedures in force. As the Storeman comments:

"Everything is a trade-off between conformance [to the Quality Procedures] and making sure that the goods get out to the customer".

From 1994 to 1997, the firm held monthly Sales and Training Meetings in the Village Hall. The various staff changes meant that, as no-one suitable would have remained to man the Works and Sales telephones at the firm, the meetings have rarely been held. All of the reps who would normally have attended expressed relief as it allowed them an additional day for selling to customers.

These meetings were stopped in July 1997 by the MD who argued that the time would be better spent working at the factory. Furthermore, the former WQ Manager, who supported the notion of management development, thought that the meetings were a wasted opportunity to discuss advice, novel sales techniques and new product information.

4.3.5 The Calibration and Service Departments

The Calibration Laboratory houses the company's NAMAS-certified capability where thermocouples and resistance thermometers can be calibrated. Calibration is very specialised, involving mathematically-based methodologies, following meticulous methods of working. The Head of Laboratory is in his early seventies and, as the MD confirms, this is reflected in his approach to his duties:

"He does things in his own way and in his own time. There's no doubting the man's *capability*...he's been doing it [calibrating] for most of his life. Getting him to use any [newer] kind of computer system is going to be an uphill task".

In 1996 Thermo-X acquired a Barnsley-based competitor calibration company, together with all assets, including their new showpiece laboratories and its highly-experienced and respected team of 6 staff. This figure had dropped to 2 by the end of 1997.

The service department at Thermo-X houses the Service Manager, (now also Deputy Head of Laboratory), an in-house engineer, an in-house apprentice and four on-site engineers. On-site engineers use obsolete laptop machines on which outdated software (the Dos-based LocoScript package) records engineering details which are then manually copied over (using 3.5" floppy disks) in the Service department. Organisational problems (co-ordination, traceability and reliability of service) in the Service department have been confirmed by several non-conformities highlighted by a recent external quality audit.

4.3.6 The Accounts Department

The Accounts department at Thermo-X, despite several staff changes during my period there, has always consisted of an Accounts Manager, an Accounts Administrator and a Purchase Ledger Clerk. The Accounts TETRA software package ran on a 3-node 9-Tiles platform serving the Accounts Manager, the Accounts Assistant and a Purchase Ledger Clerk. This network was not as reliable as contemporary, network packages (such as Novell or Windows NT) and little effort was required to cause the system to crash, which it did with frustrating regularity.

System crashes could be caused by spooling a long report or by a power surge. Once the system had crashed, the network system required anything from 30-90 minutes to reset itself and to check and repair the network configuration. Whilst remedying these errors, all Accounts personnel were prevented from executing computer-based tasks.

4.3.7 Technology as a catalyst for change

One of the objectives of the Teaching Company programme was to increase the acceptability of IT within Thermo-X and to introduce more efficient hardware and software. As will be discussed in section 4.6.3, this included the introduction of an electronic mail facility and access to the Internet.

ENHANCING COMPANY PRESENTATION

Prior to my appointment, Thermo-X had been using the services of an outside agency for the generation of company literature. The result, according to several sales representatives and customers, was very poor and unprofessional. Sales reps complained that clarity was lost (as typefaces and pitches were too small) and that the overall design of the literature was mediocre.

A drawing program and a useful DTP package was purchased. Fortunately, the majority of the old leaflets had been saved to disk. The new programs had the capability to import text and pictures from these old files and to re-arrange, re-size and re-design them in light of new requirements from the reps and the MD.

A trainee receptionist, who possessed art and drawing qualifications, showed great interest in the new packages. The MD and I decided that she be trained to use the packages and that responsibility for literature generation be given to her. Over sixty leaflets have been designed (or re-designed), as have twenty pages of the A3-catalogue and seven user-guides (for Thermo-X products), examples of which are provided in Appendix D.

TEACHING COMPANY HISTORY

At the start of the Teaching Company programme, I carried out a thorough systems analysis (using SSADM - Structured Systems Analysis and Design Methodology) on the current sales, works and purchase order system. The full analysis can be found in Appendix C.

Six months prior to my appointment, Thermo-X had embarked on the Teaching Company programme with another individual but, due to significant lack of progress, were forced to readvertise. My appointment to this position meant a total re-appraisal of the work completed by the former Teaching Company Associate.

The previous academic involvement had produced a stand-alone purchase order program which had been coded by a University researcher. The requirements for this program had been specified by the former Associate. Limited understanding of IT specification methodologies, resulted in numerous, and often major, changes and additions to the program. The program acted as a Purchase Order and Goods Received system, enabling the company to conform to Quality standards relating to traceability. The previous book-based purchase order system was kept in case of error or damage to the computer-based data. The book therefore acted as a backup to the computer-based system.

My appointment came at a time where final acceptance of the program was taking place. The time spent with the program had allowed staff at Thermo-X to comment on its advantages and disadvantages.

EXTENSION OF TETRA

I had made some progress on preparing a Requirements Specification for a fully integrated MRPII package. At this point the MD, at a regular meeting with the University, proposed that the "shell" of the TETRA system (operated by the Accounts department) should be duplicated onto a new Novell network necessitating the additional purchase of a Purchase Order module. The motive was to trial this extended system, using it to demonstrate the enhanced and increased functionality of a near-complete MIS to technophobic-employees and also to highlight any pitfalls prior to a totally new installation.

The Academic Supervisor, the WQ Manager and I voiced strong concerns at this proposal arguing that the increased functionality would be minimal and the cost relatively high. At the MD's insistence, the proposal was implemented. The WQ Manager thought that operational procedures should be tightened before moving over to any new network. He explained that moving over to a computer system would merely replicate paper-based inefficiencies. The WQ Manager cited the lack of organisational discipline as another reason for objection, stating that:

"It should be that people work and fit around the system. Here, the system fits around the people."

Part of the reasoning behind the extension of existing software lies in the MD's history with software purchases. Over time, the MD has purchased several software packages which have been superseded by more efficient packages. As the MD says:

"Don't forget that I've been through all of this before. I've bought so many packages, I've lost count. Literally hundreds of pounds worth and I've never seen any one using them. I understand that some of the packages may only cost a few pounds now [a DOS-based version of Borland's Paradox had previously been purchased for £350.00 and could be bought, at the time of writing, for £5.00]. I seem to end up paying for the latest fad item that the latest IT specialist proposes".

A Novell-based network was installed, including all cabling, trunking and software installation being carried out by a Certified Novell Engineer. Four ports were installed (Stores, Despatch, Service, Main Office) and four PC workstations and a server were purchased. The TETRA software was then copied over to the new network, the Purchase Order module purchased and installed, allowing the major task of entering product codes to begin. Although initially opposed to the TETRA implementation, the WQ Manager and I were impressed with the system and its use in preparing colleagues for the final computer-based system. The WQ Manager admitted that:

"If this system [TETRA] works, it'll be the biggest thing to ever happen at Thermo-X".

STORES REORGANISATION

In parallel with the TETRA enhancement, the Thermo-X Stores had been totally reorganised with bin locations, aisle codes and every part allocated a unique product code. Prior to the project, items were allotted locations in a haphazard manner with no product or part code. Each part had a card showing the item description and a brief movement history. Before computerisation, incoming and outgoing items were manually booked on the card system.

The "open-access" nature of the Stores has resulted in staff selecting parts at will without filling out the card or notifying the transaction to warehouse staff. Warehouse staff had additional responsibilities in other areas of the company, such as Despatch, Manufacturing and Calibration.

No coding standards or format had been agreed upon to commencement of the re-coding process. Although having the theoretical consent of top-line management, a coding system was effectively dictated by the Managing Director with little consultation (other than with sales reps) with other departments and personnel. Work commitments and poor time organisation by the MD meant that progress was very slow.

Similar parts and products (bushes and roll charts) and male/female combinations (nuts and bolts) were often located at opposite ends of the warehouse, making stock picking a tedious and laborious process. Conversely, unrelated parts, which looked similar to one another, were often placed in adjacent bins. The coding exercise was further compounded by the computer program restricting product codes to 20 characters. For several products, this was inadequate. Truncation, often meaningless to some personnel, of some codes provided the solution.

In order to expedite implementation of the computerised stock-control program, a coding standard was hastily approved by line managers and myself and the long task of data input was started. A few weeks after completion of the coding, several discrepancies were noted concerning near-identical coding structures (eg. CON SCRWRND and CON SCREW RND). Many users found this very confusing and would issue and purchase incorrect items as a result. I accepted responsibility for the new coding-structure and agreed with the MD and the WQ Manager that lessons had been learned for the final package implementation.

Several products were purchased in one unit of quantity and issued in another. For example, "500m" of cable was often issued as "1 x (500m)" drum; purchases have been made in kilograms and issued in packets. Cost prices were similarly incorrectly entered, for example, £1.25 per unit rather than £125.00 per lot. This had ramifications for the in-built First-In-First-Out (FIFO) costing system used by the software as a false product total would be calculated by the system.

Extensive pressure from the MD to rectify these errors quickly resulted in a shoddy correction process. Low morale and despondency set in, undoing earlier efforts to increase enthusiasm and knowledge of the TETRA system. Staff correcting the errors had additional responsibilities in other areas of the company which meant that some corrections were abandoned or hastily amended.

The Stores has always been open to all employees allowing "open-access" to stock. Procedures were introduced which required warehouse staff to approve all transactions. However if an authorised storeman was not available to approve the transaction, employees tended to take items without recording the transaction. This caused many problems regarding stock takes and traceability.

Before extending the TETRA system, the MD and the former WQ Manager were aware that computerisation should tighten procedures unless, of course, items were still taken out of stores unrecorded. Computerised records, if kept accurate, would drastically reduce the manpower cost of physically counting items every month or, at the very least, reduce the manpower cost of checking cards and then attributing costs to them.

ACCEPTABILITY OF TETRA

Staff required extensive training for the new system with full written procedures, placed next to each PC, complementing one-to-one assistance. The results reaped some benefits in terms of organisational efficiency. Before implementation the Purchase Order system had been a lengthy process as only one stand-alone PC was used for purchase order entry, to enter goods received and to check invoices.

These tasks were carried out by different organisational members who would have to wait patiently until the PC become available for them to use. Often, staff would become distracted with other matters and several errors and omissions occurred. All three processes (purchase order entry, goods received entry and checking of invoices) were now linked, saving time as the processes were not checked and re-checked before being passed to Accounts.

Despite my and the WQ Manager's initial concerns regarding extension of the TETRA system, we were pleased that the MD's approach had proved its worth in many different areas including:

- expediting the allocation of product and part codes
- expediting the ordering of the company stores
- the production of monthly and quarterly stock reports
- demonstrating to staff the use of a networked software package
- showing current stock levels of items required by customers or in the workshop
- eliminating the problem with physical congestion around the old stand-alone PC

Limitations in the system lay with the limited functionality and ease-of-use of TETRA. The age of the package has meant that such fields as "Supplier Fax Number" were not available on the system. Concerns that the system would not allow additional text to be entered (for example entering a different delivery address) was resolved by writing this information onto the printed purchase order by hand.

The TETRA system assumed that purchase order data would be printed on pre-printed TETRA-stationery (solely designed for sprocket-based dot-matrix printers). Thermo-X's desire was that the purchase orders be printed on A4 paper using a laser printer. This was achieved by designing a Thermo-X Purchase Order "template" using Microsoft Word. This template was printed onto a Thermo-X letterhead and sent to a printing company for duplication. On return, these were used as purchase order sheets for the laser printer.

The MD, although acknowledging these problems, regarded the implementation as an overall success as his original objectives for linked, computerised, data entry had been met. Not all staff were convinced. Contrary to the system's intentions, a storeman regarded the computer system as an addition to his workload, complaining that:

"This computer system seems to create more work...it makes you work twice to get back to the Main Menu when you should be able to just press a key to take you to the relevant screen".

This shortcoming could not be resolved due to the nature of the TETRA package. However, the storeman agreed that progress had been made, adding that:

"Stores need to be tighter. Since this thing, [TETRA], things do seem to have got tighter. It's not perfect yet, but we're getting there".

NEW MIS SYSTEM

Early in 1998, the decision was made to purchase a new company-wide Management Information System to replace the TETRA system. TETRA's shortcomings included the inability to add additional text on purchase orders and an inability to incorporate fax numbers or to deal with mailshots. Thermo-X also required the purchase, sales, invoicing and stock functions to be linked. The TETRA licence limitations (four users) meant that this capability could not be used. Increasing the number of TETRA licences would not have been financially viable.

REQUIREMENTS DEFINITION

After consultation with all staff (sales, purchase, management, accounts, stock and production), a requirements list was created and distributed to four MIS manufacturers:

Accounting: Management and Financial

Nominal Ledger	Sales Ledger	Purchase Ledger
Cash projection facility	Bank query	BACS
Label printing	Integration to WIP	GRN matching
Period End	Transaction Posting	Refunds Management
Cash Book facility	Audit Trails	User-defined remittances
Detailed screen enquiries	Customer "on-hold" facility	Foreign Currencies
Balance Sheets	Monthly accounting	P/L analysis by Sale

Sales Ledger

Foreign Currencies	Batch Transactions	Process Invoices
Full invoice VAT analysis	Settlement discounts	Cash allocation to invoices
Part-payments	Reminder letters	Analysis of unrealised P/Ls
Promotions to customers	Address labels (mailshots)	Sales ledger reports
Audit trails	Aged Debtor analysis	Foreign Currency analysis
Nominal Ledger analysis		

Purchase Ledger

Foreign Currencies	Batch Transaction	Invoice processing from PO
Invoice VAT analysis	Settlement Discounts	Cash allocation to invoices
Full/part pay to invoices	Payment (cheque/BACS)	Unrealised profit - P/L
Supplier mailshots	Address labels (mailshots)	Prospect handling

Reports on purchase ledger listing, audit trails, invoice authorisation, cash required report, aged creditors analysis, foreign currency analysis, nominal ledger distribution analysis

Nominal Ledger

Own accounting periods	Pre-payments and accruals	"Template-journals"
Automatic journal balance	Auto-post recurring journals	Prospect handling
Transaction enquiries		

Reports on chart of accounts, detail trial balances, summary trial balance, journal audit trail, bespoke report facility

Customer Management

Prospect handling	Keyword search	Mailshots management
Detailed reporting	Intrastat	Customer part numbers
Free-format text fields		

Sales Order & Invoice Processing

Min. profit level checking	Label printing	Detailed reporting
Re-print facility	Detailed browses	WIP links to POs
Free-format text	Credit warning	Reorder warning
Invoice serial numbers	Price lists	Global updates
Settlement discounts	Category update of prices	Part price list changes
Order acknowledgements	Invoice address	Non-product invoicing
Credit card system	Order line comments	Invoice/credit enquiries

Adjustment of stock figures when stock is returned or despatched
 Amend product and pricing information on each invoice-line (price, discount etc)
 Cross-referencing with Customer Management
 Either post invoices and credit notes to Sales Ledger immediately or batch-process them using Sales Ledger

Sales Analysis

Top customers ID	Top selling-items ID	Detailed stock history
Bottom-line profit protection	Sales profitability reports	Customer analysis
Product group analysis	Profitability analysis	Commission structure

Reports on order status, order product analysis, sales history detail and sales analysis, summaries and bespoke report-writing facility
 Invoice and detail data updated "on the fly"

Supplier Management

Parts matrix (description, changes, reputation, lead time, costs)
 Price matrix (quantity breaks, product-specific, free-format text)

Purchase Order and Invoice Processing

Allow free-form text	Print-to-fax capability	User-defined PO format
Purchase volume control	Returned goods	Match single goods receipt
Invoice with several orders	PO progress enquiry	Amend price/delivery
Supplier part number print	Print product description	Unit cost of goods received
Display of discount rates		

Purchase Ledger Invoice batch from suppliers' invoices
 Automatic adjustment of stock levels when goods are ordered and received
 Reports on order status report, audit trails, purchase history report, period variance report (expected -v- actual costs)

Product Costing

Costing of item/job/batch	Profit/loss of manufacture	Profit margins
---------------------------	----------------------------	----------------

Stock Control

Multiple warehouses	Multiple locations	Stock history
Continuous/full stock-take	Auto-update of stock records	Variance reports
Detailed screen enquiries	Sales history	Valuation-by-age reports
Inspection receipting	Alternate supplier codes	Alternate product codes
Materials reservation	Materials allocation	Adjustments

Reports on stock status, ABC analysis, inactive items report, audit trails, batch tracking, stock history, re-order report

Calculation of re-order levels automatically (if required)

Average, last, standard, WA, FIFO, LIFO costing

Supplier/internal product code cross-reference

Conversion units and factors (eg. supplier provides by roll, we sell by metre)

Works Order Processing (+ Costing)

Standard manufacture time	Routing	Lead Times
Actual manufacture time	Shopfloor data-capture	Bar coding
Work-to-order	Work-to-stock	

Master Production Schedule

Standard manufacture time	Routing	Lead Times
Sales forecasts	Suggested build schedule	"To promise" enquiries
Product-coding conventions		

Materials Requirement Planning

Finite capacity planning	Infinite capacity planning	Jobbing MRP
Batch MRP	Forecasting	Integration with MPS

Quality

Audit programme	Rejection levels/analysis	Vendor assessment
Supplier quality categories	Questionnaire despatch	Record-keeping capability
Complaints		
Inspection and testing scheduling (reminders, call back)		

Payroll

Integration with shopfloor-data (Works Order Processing)

Systems Management & General

"Tabbing" fields	On-line help	Screen colour changes
Administrator menus	Search mechanisms	Password control
Tailorable prompts	Multi-company operation	

Rearrangement of screen for efficient and fast DP, based on changing business requirements (flexible screen- and field-painting)

Assets Register

Book and Tax depreciation	Reducing balance	Revaluation of assets
Sub-asset attachment	Asset history	Detailed reporting

Calculation of depreciation at time of take-on

Calculation of profit or loss on sales of assets

Integration with General Ledger

Report Writer

"No programming" option	SQL compatible	Menu-driven design
Conditional statements	WYSIWYG layout	Business graphics
Sorting and Totalling	Preview on screen	Import/exports

SAGE STERLING

Five MIS packages were identified which complied with the functional requirements list. Four of these packages (and their resellers) were deemed to be financially prohibitive and subsequently, Sage Sterling ('SAGE') was chosen as the new MIS package. User visits and discussions with four resellers allowed Thermo-X to choose a reseller and trainer who operated in the region.

Network hardware and additional cabling and trunking was installed (fourteen additional ports were installed to be used by service, calibration, IT, accounts, sales, purchase, reception and quality). Several 486 and Pentium-based PCs were purchased and configured for use with the new network. A training programme was organised for the new system ready for a June 1998 switch-on date which was achieved.

Given the inherent difficulties of acclimating themselves to the new system, most users were generally pleased with the increased functionality and ease-of-use of the new System. I again created tailored User Guides (reproduced in Appendix D) which were placed next to each workstation, facilitating use of the new procedures.

Some users did encounter some difficulties in operating the new system. It was found that the majority of these difficulties were due to unfamiliarity with the new system as some users, being so familiar with the old system, had been replicating key strokes from the previous TETRA system. Access rights to the old TETRA package had been removed but the package, together with the old data, remained on the server in case it was needed internally or for external auditing.

Gradually several members of staff became enthused as they began to see the benefits of the new system. The total cost - server, new PCs, network cards, network software and installation, cabling/trunking, Sage program, Sage training - was almost £7,000. Many users asked for additional functional requirements (such as sales forecasting and automatic updates of purchase and sales ledgers) after installation. It was explained that, to have met such detailed criteria, would have meant an additional investment of several thousand pounds. Financial constraints facing the company precluded the company from such a decision.

I depicted, in Figure 4.5, the legacy systems in place at Thermo-X prior to my appointment. Having discussed the various technical improvements (such as improved data connections, data and information sharing and increases in network speed and reliability) made to the IT and IS infrastructure, it may be beneficial to reflect these in a new schematic. Figure 4.6 depicts the IT and IS systems at the end of the project (September 1998).

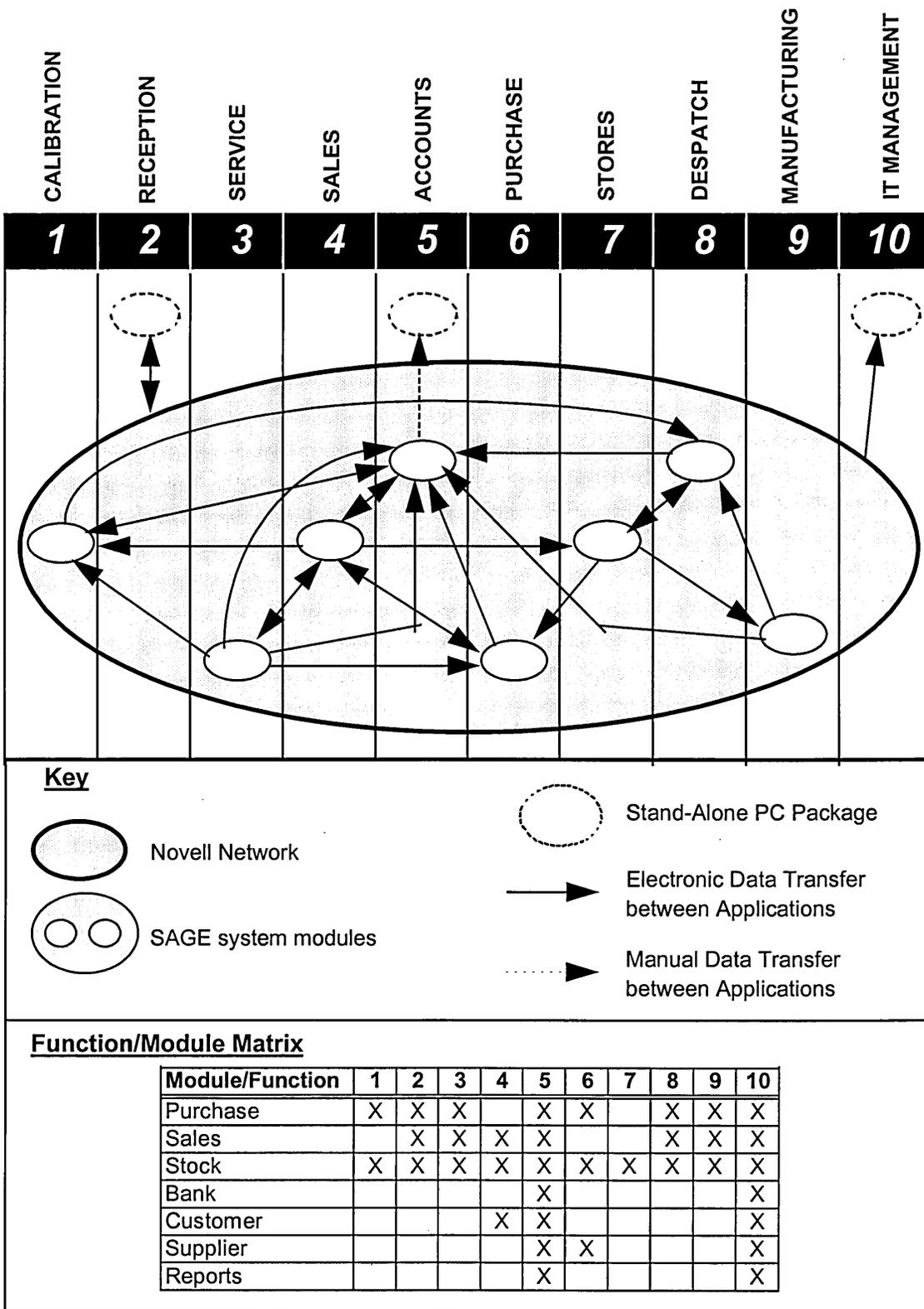


Figure 4.6: New IS systems at Thermo-X

4.4 Organisational Structure and Organisational Initiatives

Whether the Thermo-X organisation is adaptable and how its culture can be engineered will now be discussed. Additionally, from a cultural perspective, the cultural theory which Thermo-X best display will be analysed.

The MD is, and always has been, the owner of the business and has substantively set up the operational procedures and established systems within which the company now operates. The company's incorporation in 1994 and subsequent NAMAS and ISO9002 accreditation allowed the company to make some changes to its organisational structure. Department managers in the areas of Quality, Production, Service and Accounts were employed or redeployed to these new positions.

The MD is fully responsible for the general day-to-day running of the organisation. Despite this, everyone at the firm is agreed that the MD's greatest strength is his ability to sell. The Accounts Administrator, with supporting financial evidence, says that:

"No one can shift items like him. When he's on the Sales Desk, items do move. We [the firm] would be much better off if he stayed down there [the Sales Desk] full-time".

Employees at the firm who have known the MD since the creation of the company have confirmed that, as the company has grown in size, the MD's ability to delegate tasks and duties has lessened. The ultimate result of this is that his attention has been diverted to other areas of the organisation.

It was recognised within the company, and by certain customers, that the level of employee competence, coupled with its detailed industry knowledge, gave it a significant advantage over its competitors. Several initiatives were taken in order to change the structure of the organisation. These initiatives were overseen by the WQ Manager.

4.4.1 The Thermo-X Exhibition

The MD made the decision, at the time of the company's incorporation, that the focus of its future activities would be centred around meeting customer needs. The decision was made to lift and promote the company's profile, exploiting ISO9000 and NAMAS accreditation, to capture new markets and an exhibition in a South Yorkshire hotel was organised.

Although the exhibition took place before my arrival at the organisation, interviews with staff and examination of relevant literature has enabled me to present an accurate summary of the events in question. The organisation based its marketing-led improvement programme around three fundamental service precepts:

- (1) Total measurement solutions
- (2) Total maintenance and service
- (3) Quality, traceability and accuracy

The exhibition made significant inroads into informing customers, both existing and potential, of the changes taking place and the level of competence and expertise behind the organisation. The promotion of the exhibition, and the exhibition itself, raised the company's profile and informed customers of the enhanced level of its expertise.

Unfortunately, bad weather hampered attendance but sufficient interest arose to garner several profitable enquiries. Advertising in national journals contributed to the organisation's image as a substantial supplier of instrumentation and process control equipment. Additionally, the exhibition gave employees an insight into the true potential of the company and established the beginning of a change process which reiterated the company's theme for constant improvement.

4.4.2 NAMAS Accreditation

Thermo-X's capability culminated in its acceptance for NAMAS (National Measurement Accreditation Service) accreditation in 1994. Several customers had introduced policies to purchase goods and services only from companies possessing NAMAS and ISO9002 accreditation.

The aims of NAMAS revolve around improving the authority and standard of UK calibration and testing thereby sustaining the quality and reputation of British goods in domestic and international markets. It is envisaged that the recently-formed UKAS (United Kingdom Accreditation Service) organisation - formed by the merger of NAMAS and the ISO9000 series accrediting body NACCB (National Accreditation Council for Certification Bodies) - will do more to promote the value of holding accreditation.

The technical advantages of NAMAS are clear: confirmation that products are manufactured to correct specification (and that all dimensions fall within specified tolerances), and a guarantee that equipment has been measured to national standards. From a corporate perspective, the company trumpeted its NAMAS accreditation which has become central to its Sales strategy.

The MD continually supplied material and comment to NAMAS on competitor misuse of the respected NAMAS logo, arguing the case for companies to insist on NAMAS calibration rather than opting for less expensive, and less reliable, calibrations from un-accredited Laboratories.

4.4.3 Investors In People (IIP)

The Investors in People ('IIP') initiative is based on four principles:

- Commitment to develop all employees to achieve business goals and targets
- Reviewing regularly training and development needs in the context of your business
- Taking relevant action to meet training and development needs throughout people's employment
- Evaluating outcomes of training and development for individuals and the organisation as a basis for continuous improvement

Following a diagnostic report by the local Training and Enterprise Council ('TEC'), in 1995, a training policy statement was issued introducing and detailing the training programme committing one day a month training for all employees. The programme was supplemented by external training courses and other internal training sessions as deemed necessary. Substantial investment in the IIP initiative has been made and employees have been made aware of Thermo-X's commitment to training. Appraisal and Review programmes have concentrated efforts on the establishment of training plans for all employees which have been successfully implemented.

4.4.4 Modern Apprenticeships

The Modern Apprenticeship scheme is supported by the CBI and TUC and is run by employer-led partnerships between industry, training organisations and local TEC's. The concept is becoming widely used by companies who may be ideally-placed to develop their younger employees by giving them practical job-related skills. The three year duration of the schemes are subsidised by the TEC which contribute to training and development costs.

The programme has helped Thermo-X to accurately identify existing and future skill requirements which will become increasingly relevant as the company continues to update its systems and introduce new technology. The training plans focus on job specifics which, in turn, improve product quality standards. To date, Thermo-X has employed four apprentices.

4.5 Thermo-X Organisational and Cultural Issues

Theoretically, changing the organisational structure of Thermo-X should have distanced the MD sufficiently from daily involvement in the detailed mechanics and operations of the organisation. The MD should then be free to concentrate efforts on the *macro* levels of the company (such as national expansion and a focus on global exports) rather than at the *micro* level of the organisation already discussed.

This section will address the needs of managers at Thermo-X, be they at a junior, senior or assistant level. All of the managers at Thermo-X have progressed through a traditional "bottom-up" approach, starting at a relatively low "rung" in an organisation (not necessary Thermo-X).

Progression has been based on experience, length of service and merit to reach their present positions. Proportionately little focus has been directed at these managers who may never have received formalised training in supervision and management. Those who have received some form of training may be more suited to working in much larger organisations where formalised "tiers" of management and responsibility exist.

As a consequence, many managers at Thermo-X are ill-equipped to competently cope with and control the growing, and possibly conflicting, needs of a SME. This then impacts on their ability to effectively cope with Thermo-X's needs for efficient internal communication and appreciation of the need for change whilst adhering to the MD's corporate aspirations.

However, significant progress has been made as, although management training has mainly been product-based, the recognition that a computing systems problem existed can be regarded as a major step forward. As has been discussed, the monthly management meetings, held from January 1996 to April 1997, were beginning to reap benefits in improved communication and debate.

As interest waned, and as attending to urgent orders began to increasingly excuse a manager's absence at these meetings, these meetings were abandoned. A "framework for change" (given in table 4.2) was introduced in 1995 by the WQ Manager in an effort to present Thermo-X with a plan detailing the changes required and the changes taking place.

This framework encompassed the quality precepts of quality circles, team meetings, brainstorming sessions and attempted to explain the importance of employee empowerment. Depictions of management and organisational structures, which had never previously existed, were used to great effect when explaining to shop-floor staff the impact of any changes on their departments or daily working practices.

An additional problem concerned employees not adhering to the correct procedures and disciplines for any computer system. Certain managers have been inclined to follow old, familiar, procedures rather than learn and practice the new systems. This "in-built" response (to follow established procedures) to certain duties was inherent in the culture in order to carry out their tasks quickly and effectively.

The introduction of computers was, at first ignored by those employees who felt disinclined to use them. The organisational changes brought about as a result of both the TETRA extension and the implementation of the new SAGE system were introduced with the full support of Senior Management. Difficulty arose in maintaining and sustaining the hard work expended in introducing these changes.

So what is the solution? How can these managers integrate more fully into the new procedures and practices required by the IT project and other change processes? For these managers to learn new skills and attend training programmes would be financially prohibitive for a small business such as Thermo-X and, if the investment were made, there would be no guarantee that things would change.

Whilst this scenario continues to exist, the MD will continue to have a firm and authoritative hold on the company, one where he is reluctant to delegate to these managers and one where he becomes increasingly frustrated with the rate, and take-up, of change.

My time at Thermo-X illustrates the role and importance of the MD in the cultural change process. In a founder-led organisation, such as Thermo-X, the role of "top-down" support for the change processes is of vital importance. The MD has been involved in the formation of the majority of procedures and processes, spanning from Sales and Recruitment through to Quality.

When Thermo-X was incorporated in 1994, the MD set an ambitious, but not wholly unrealistic, growth-rate target (to increase turnover to £2 million in the next 5 years with the export contribution increased to 20% mainly from European markets) which was coupled with his opinion of the cultural changes necessary in order to change and influence the company. At that time, his role encompassed all aspects of the sales functions, manufacturing works management and development, all financial matters and the instigation of improvement programmes for the company.

Ideas for growth stimulation and areas for improvement have always been initiated by the MD with little input from other employees. Whilst possessing such strong leadership skills can be considered advantageous in assisting a cultural change programme, I would suggest that it can also hamper management development if the emphasis is placed on outdated methodologies ill-suited to the needs of company personnel.

The introduction of IT (by way of the MIS and contemporary IT and IS techniques such as Internet, email and Windows-based packages) into Thermo-X has considerably altered the MD's role within the organisation. The data and information produced by the IT, such as financial data highlighting inefficient areas of the company, has enabled the MD to focus his attentions on eradicating other deficiencies within the Thermo-X organisation. These include such areas as the duplication of data-processing tasks, ineffective communication routes and the poor co-ordination of orders spanning more than one department.

Having worked at Thermo-X for a thirty-month period, my own observations lead me to submit that the atmosphere and culture of the firm changes dramatically according to whether or not the MD is present. When the MD is in the building, employees are automatically on their guard in case the MD appears without warning in their department. When the MD decides to sift through departmental paperwork, employees become nervous, fearing the discovery of a discrepancy.

In simple terms, I would say that Thermo-X operates within a "*blame culture*" where employees are regularly chastised for their mistakes and seldom praised for their achievements. Often, these mistakes are regarded as such only by the MD who may eventually warm to the concepts originally suggested to him. The example of the Stores reorganisation (given in Section 4.3.7) confirms this attitude and suggests that, at Thermo-X, an idea is only given due thought and consideration if it has originated from the MD.

My participant-observation experience at Thermo-X supports Carnall's [1995] theories relating to *Entrepreneurial structures*. In these simplistically-modelled organisations, corporate decisions and long-term strategy is dependant on the owner of the business who makes all such decisions. Staff are employed to carry out specific tasks but, as the organisation has no real departmental structuring, this can actually benefit the company as flexibility is increased.

My experience at the company confirms Handy's [1985] definition of the *Web Culture* which depicts an organisation as a spider's web. A dominating individual (or team), who has overall control and a strong leadership ethic, is surrounded by other members of the organisation who must support this dominating personality in fulfilling its corporate ambitions.

4.6 Changing the Thermo-X Organisational Culture

This section will discuss how the Thermo-X culture was changed in preparation for the incoming MIS. Researchers ranging from Earl [1993] to Zmud [1984] agree that organisations attempt to change their culture in order to bring about a strategic change such as the introduction of a Management Information System. As discussed in Chapter 2, and reported by Brown [1995], established culture-change researchers have put forward several cultural change models with no framework in clear dominance.

Due to the numerous and varied definitions of culture, it is conceivable that attempting to change organisational culture according to one researcher's model may be significantly easier than using another researcher's approach. The very diversity of the culture-change models illustrates their respective weaknesses in addition to their intended strengths. Given that the various models have provided great insights into the culture change process, the highlighted concerns should be explored further.

A literature review of the culture-change frameworks has shown that different researchers vary in their preference of a basis for cultural change. As detailed in Chapter 2 (Section 2.5), none of these models or frameworks is necessarily wrong as each possesses its own advantages and disadvantages and the ideal cultural change model may well be a skilful blend of the most pertinent tools and techniques from this range. My review concluded that successful organisational culture change possesses four common precepts:

- the existence of an initial crisis
- the existence of strong leadership
- emphasising the importance of success
- the importance of supporting change.

DEFINING THE THERMO-X CULTURE

My opinions of changing the Thermo-X culture revolved around an incremental change. Additionally, I was aware that constant support, encouragement and motivation would be vital in changing the perceptions of staff regarding the incoming MIS. When changing the Thermo-X culture, the following definition of Thermo-X was agreed by employees and used in discussions with them:

*The Thermo-X Culture:
The attitude which governs the way that we do things here*

Employees agreed with this definition stating that it described in relatively simple terms the attitudes, values, beliefs displayed by Thermo-X. In chapter 2, I described organisational culture as "an attitude which governs the way things are done in an organisation", and said that this definition was based on the viewpoint of Bower [1966] who thought of culture as "the way things are done around here".

CHANGING THE THERMO-X CULTURE: THE ISSUES

Before discussing the culture-change activities, I feel it would be useful to list the many different technical, organisational, theoretical, psychological and managerial issues that I considered. These issues revolved around my perception that the technology was to be the catalyst for change and would effectively "drive the change". This personal view allowed me to realise that the key issues to consider were:

- the business circumstances of the organisation, the overall strategic plan, the emergence of new task requirements
- the impact of the organisation's structure and the existing procedures, practices and systems
- the design of jobs in relation to new tasks
- the skills of managers and plans for training and staff development
- attitudes, motivation and commitment of all employees
- nature of the process for developing and updating the technology used by the organisation and the extent to which future users are involved
- design methodology and project management, the composition and effectiveness of any project team
- the state of industrial relations in the company

After considering these issues, and after forming an opinion of Thermo-X's attitudes, beliefs and values, I turned my attention to the type of tasks and jobs which would be most desired by its organisational members. As an "agent of change", it was my task to ensure that as many of these objectives were met:

- The job should provide some *skill variety* encompassing pace, method and skill. The job should entail different activities and involve the use of a range of valued skills and knowledge
- *Task Identity* should be used to form a coherent whole job which makes a recognisable contribution to the end product and a visible outcome to the job holder
- The job should have *task significance*, that is that they should have a meaningful impact on other people and carry recognition of this
- The job should provide *autonomy*. Jobs needs to provide freedom, independence and discretion which would enable Thermo-X members to contribute to decisions affecting their jobs, for example in the setting of objectives, planning of work, determining how to undertake it, and controlling it. There should be opportunity to take responsibility for outcomes
- *The role of feedback*. Thermo-X work activities should result in direct and clear information on effectiveness of job performance both directly to the organisational member concerned and through the wider knowledge of other people. This should provide a sense of achievement

- Employees should be allowed to *learn*. Employment should provide an opportunity to develop new skills, an opportunity for learning and to exercise problem solving within the individual's competence
- The job should provide an element of *personal development* and should be seen to be leading towards some sort of desirable future, providing a degree of challenge
- The job should meet *socio-psychological needs* providing adequate support for contact with others
- The job should possess sufficient *resources* which ensure that goals and other people's expectations are clear and that adequate resources are provided, ie training, information, equipment, materials

With these issues and "new" job requirements in mind, this section will detail the various activities which I carried out at Thermo-X in order to engineer the culture in preparation for the impending IT overhaul. Each method will be accompanied by examples and diagrams where applicable and will discuss how the success of the culture-change activities was measured.

4.6.1 Diagnostic Activities

My first few days at the firm were spent introducing myself to the employees. Several were openly worried about my presence and expressed concern about the possible implications to their familiar work patterns. I tried to put all employees at their ease, using non-technical terminology at all times. I assured employees that anything that was said would not be reported to the MD.

This constant encouragement elicited valuable opinions on the Thermo-X culture and organisation and detailed complaints on the state of IT equipment and past IS strategy.

Understandably, many employees were tight-lipped, erring on the side of caution and saying nothing that could incriminate them to the MD. However, over the next few weeks, as their acceptance and confidence in me grew, it was these same employees who were willing to confidentially discuss the true working climate of Thermo-X. The alternative to my approach would have been to stay in my office familiarising myself with the Quality Manual and other company literature. These essential tasks were taken home giving the opportunity for me to introduce myself to the employees.

COMMENTS

This method can be compared to a research and diagnostic activity. The status of Thermo-X organisation was ascertained and the true nature of the cultural and organisational issues uncovered. The effectiveness of this approach was gauged by the attitudes and feedback of colleagues. My appointment had been viewed with cynicism by some organisational members as the previous company involvement with the Teaching Company programme (as well as the limited success in implementing previous computer-based information systems) had been unsuccessful. The previous Teaching Company Associate had not made any attempts to introduce himself to Thermo-X staff which had increased the cynical view of both the Associate and of the system implementation.

I operated an "open-door" policy explaining to all staff that my office door was always open if anyone wanted to discuss the impact of the TETRA extension. Armed with questionnaire sheets, I spent my first few days at Thermo-X going to each employee in turn.

I introduced myself, briefly discussed the nature of my role and encouraged them to talk freely to me regarding organisational problems. Some employees were hesitant to do so at first, fearing that their comments might be reported back to the MD. I assured them that this was not the case and offered to put away my notepad. This approach reassured these sceptical staff members who proceeded to relate their perceptions of Thermo-X.

Several months later, my first-day approach was remembered during a discussion with the Works Foreman. The Foreman related how the IT Manager at his previous company had not carried out such an approach. As a result, confidence in the implementation process was reduced and fear regarding employment security had increased.

4.6.2 Team-Building and Process Consultation

Before my arrival at Thermo-X, the firm had introduced monthly management meetings held at a local hall. In order to communicate the intentions and progress of the TETRA extension, I attended twelve of these meetings. The meetings were to be used as a forum for open discussion. On one occasion, I was allocated a three-hour period in which to explain the use of the new product codes and the mechanics of MRPII. A sales representative commented:

"We [Thermo-X] seem to have our head in the clouds all the time. We need to walk before we can run. We're not one of the Big Boys [in the industry]. We don't have the luxury of being saved by a big American company who can support us and bail us out if needed."

Comments such as these illustrate the initial enthusiasm of the new computer-based information system (Tetra or Sage). It further illustrates the need to educate employees in the advantages of new systems and highlights the importance of communication and dissemination throughout the implementation process. The Thermo-X Accounts Administrator regarded the proposed implementation of MRPII as a bad idea:

"We're not ICI. We're a small business which needs massive investment [in the company as a whole] - far more than we [Thermo-X] have - to make us grow".

COMMENTS

The monthly meetings had been used to analyse existing work procedures and to introduce the concepts and objectives of the new system. Feedback forms were used to gauge understanding and agreement of each presentation. The warehouse staff and several reps told me that their involvement had made them feel that "they were contributing" to the creation of new product and component codes. The collective experience of these personnel meant that the new product codes were based on sound industry knowledge and an understanding of customer needs.

Table 4.3 shows the number of respondents for each meeting, the average level of understanding, the average level of effectiveness and the average level of agreement of the monthly presentations. Levels of effectiveness, understanding and agreement were scored out of 5.

Topic	Respondents	Average Effectiveness	Average Understanding	Average Level of agreement
Introduction	18	4	3	3
Tetra	18	4	3	3
Mini-project	16	5	4	4
Product Coding	12	4	4	4
MRPII + codes	22	3	3	3
Product coding + Email/Internet	10	4	4	4
Catalogue + Product coding	10	4	4	4
Catalogue + Product coding	12	4	3	4
Catalogue + Product coding	10	3	4	4
Catalogue + Product coding	9	4	3	3
Diary/Price lists + Product coding	11	4	4	4
Diary/Price lists + Product coding	12	3	4	4
Sage	7	3	4	4
Sage	8	4	4	4

Table 4.3: Monthly meeting responses

4.6.3 Introducing more efficient Technology

One of the first initiatives that I carried out was to formalise an "IT Department" as Thermo-X did not possess any real disciplines in this regard. IT hardware and software (including original copies) were stored everywhere in the organisation and centralisation was called for.

I carried out a full systems audit, documenting hardware specification, age, condition, supplier details, present use, serial numbers, part codes and approximate cost. For software products, licence details and codes were also recorded. The systems audit log was stored off-site for security purposes. All small IT equipment, including such items as software packages, licences, blank disks, mice and keyboards were stored in a new metal cupboard, specially purchased for this purpose. Keys for this cupboard were retained by myself and the MD.

Formalised reporting and control procedures were put in place, such as maintaining a full log of all incoming and outgoing IT equipment and seeking authorisation from the IT Manager for such movements. Formalising the "IT department" in this manner demonstrated to staff the importance of correct and recognised procedures concerning IT equipment. Before implementing any new computerised systems at Thermo-X, formalisation of existing IT procedures and additional procedures assisted staff in recognising the importance of the IT project. Highlighting proper and effective lines of communication helped staff to follow correct IT disciplines. After an adjustment period, this new system worked well.

During the first few weeks at Thermo-X, my main task was to introduce a contemporary Word Processing package to the secretarial staff. Prior to my arrival, Thermo-X had been using the DOS-based version of *Wordstar* which, although generating hard-copies from a laser-printer, was restricted by its use of the dated *Courier* font. The reception staff were in agreement that the result was shabby and, if they were a potential customer, the standard of presentation would not instil confidence in them. In-depth training and one-to-one support was given when the company went from *Wordstar* to Windows-based *Microsoft Word*. The feedback from these sessions was very positive.

Department heads and reception and secretarial staff were consulted in order to agree on a "corporate image" - which fonts to use for which function (for example, quotes, press releases and faxes) and at what pitch. Almost immediately, the enhanced functionality, ease-of-use and visual impact of finished documents drew favourable comments from established customers and Sales Representatives. The *Word* implementation (which took approximately four weeks including installation, training and mentoring) went a long way in demonstrating to Thermo-X the benefits of IT when implemented correctly.

The "consultative process" - eliciting the views of staff for the company fonts - was initially viewed with scepticism by some members. However, as staff began to see that their ideas and opinions were being openly discussed and debated, many began to welcome the opportunity for input. One of the reception staff commented that this:

"...way of doing things doesn't seem normal for Thermo-X. Normally, we are just told that we are doing it this way and that's that".

I allocated time to train individual staff, on a one-to-one basis, to use Microsoft's Word, Excel and Powerpoint, the email facility and the internet. Many members of staff had not experienced individual mentoring before and an adjustment period was necessary. I created bespoke training documents and manuals, tailored for each individual.

Several months later, management expressed interest in using electronic mail (email) and were keen to make use of the Internet as an additional sales tool. Through its existing association with the local TEC, Thermo-X signed up for a 12-month Internet trial. The website in its entirety is reproduced in Appendix D.

The TEC contracted out the internet service to a local firm who subsequently went into liquidation. Hence, Thermo-X only managed to "upload" half of its intended homepage to the World Wide Web (WWW), omitting the vital half containing a list of products and services offered. On hearing news of this, some organisational members (particularly the sales reps) were disappointed whilst others (for example the Head of Laboratory) felt vindicated in his opinion of new technology and the IT Project. I attempted to rectify the problem but the liquidated company had password-protected the website.

The company however did take full advantage of the email facility, and the additional data-transfer functionality offered by the modem, and have been able to communicate efficiently and effectively with a new trading partner in the United States. Again, this demonstrated to the firm the benefits of contemporary IT techniques. I trained and mentored one of the service engineers to use this new facility. The full manual is provided in Appendix D.

A computerised road map, *AutoRoute Plus*, had previously been purchased by Thermo-X by a former IT Manager who had left the company before installing the program. I discovered this package as part of an internal IT audit and installed it on the new Novell network. Loading this program to the network proved to be effective on two counts. Firstly, the installation demonstrated to Thermo-X employees that the best could be made of *existing* software and hardware. Secondly, the program's ability to calculate optimal travel routes, times, distances and costs allowed service personnel to accurately quote service prices to customers. The speed of this response, often carried out whilst the customer remained on the telephone, pleased both staff and the customer.

A network-ready computerised diary, *Lotus Organizer*, was purchased and installed on the network (in order to allow users to share and view data and appointments). This diary was split into three categories: a general Thermo-X diary (replacing the book-based diary in Reception), a service diary (recording and monitoring service appointments) and an accounts diary (comprising important financial information). The diary implementation was again accompanied by a brief instruction manual, which is provided in Appendix D.

Many favourable comments were received for the Thermo-X diary. The diary enabled daily appointments to be viewed by any organisational member. Whilst arranging an appointment with a customer or supplier, a Thermo-X employee could suggest a date and time in light of prior engagements.

Price-lists were computerised using *Microsoft Excel* and placed on the network. Updates and corrections to this list required a password and, as such, could only be carried out by the IT Manager. For the first time, the price-lists allowed the company to share a "common" pricing-policy. Previously, the MD would have been consulted for many prices, thus detracting his attention away from other commercial matters. The new system allowed sales staff to accurately quote current prices for products and services without reference to the MD. I suggested that a brief *Microsoft Excel* training course would benefit those staff members who would take over my duties when I left (in order to alter prices or formulae).

A "calibration reminder" system was created using *Lotus Approach*, a simple yet powerful relational database package. Calibration customer records were entered into the database, including such details as calibration date, equipment detail and technical calibration data. The database program was then used on a monthly basis to generate annual calibration reminders for a mailshot. In this way, customers were given approximately thirty days notice that their annual calibration was due. The new system aided Thermo-X in enhancing traceability and many customers were pleased that responsibility for remembering calibrations had been removed from them.

This system has met with several problems, due to a lack of communication between organisational members and a limited understanding of the database software. On my departure, academic staff have changed the database to *Microsoft Access* allowing full automated integration with *Microsoft Word* for the generation of certificates. None of the records could be transferred electronically and therefore had to be re-typed manually.

The key to acceptance of all of the described new technologies was to involve people at every stage of the implementation process (*pre-implementation*: telling staff what the new system would do and how it would assist them, *implementation*: one-to-one and group/department training and *post-implementation*: returning to users to check understanding and ensuring optimal use of the system).

4.6.4 Extending existing Information Systems

The TETRA extension allowed Thermo-X to include such modules as Purchase Order Processing and Stock Control. The idea was to acclimate those users who had never used a computer before whilst also acting as a mechanism to identify those functions required by the new system.

Again, one-to-one training was used to reassure and support colleagues in the transition stage of TETRA extension. I created tailored training sheets and instructions which were given to each user of the extended system. The full TETRA manual is provided in Appendix D.

The extension of the software to include Stock Control necessitated the comprehensive introduction of Product Codes, Bin Locations and their subsequent entry onto the computer system. My active involvement in the creation of product codes and reorganisation of the company Stores made great inroads in confirming to employees my own personal commitment to the objectives of the project at a "hands-on" level.

COMMENTS

Reorganisation of the Stores area took several weeks. On completion, reps, internal sales staff and the warehouse staff commented on the clarity of the layout. Aisles were labelled and shelves labelled and numbered. As far as possible, parts were stored in appropriate "groups", for example ceramics, cable, plugs and sockets. Ideas and opinions from all staff was openly encouraged, discussed and, where applicable, utilised.

Data-entry of these new product codes was facilitated by both my and my colleagues' fuller understanding of the products and their constituent parts. In gaining this understanding, a new product-code strategy was formed. The WQ Manager, the MD, warehouse staff and I agreed that all codes should be kept as simple as possible (previously, Thermo-X had used the original supplier product codes). For the new coding structures, alpha codes (such as FLANGE 10) were preferred over numerical codes (such as 123-4567) as it was felt that this strategy would enhance understanding of the products and parts both internal and external to Thermo-X.

4.6.5 Restructuring work, roles and tasks

Implementation of IT systems (whether this was an extension of existing technology or the full implementation of a new system) involved some restructuring of people's roles and tasks within the Thermo-X organisation. My aim when carrying out such changes was not merely to just change job titles, but to redefine and enhance the role of the individual concerned. By way of example, a Thermo-X typist was given additional responsibilities for DTP and graphics work, thereby increasing the variety of her daily tasks.

Different strategies and structural change mechanisms were carried out. These strategies and mechanisms included job and task rotation, job and task enlargement and job and task enrichment. The objectives behind job and task rotation was to increase the scope, interest and variety of daily activities. Additionally, experiencing different areas of the organisation aided staff understanding of the computerised systems as a whole. In doing so:

- new skills were added (but the level of these skills not necessarily increased)
- staff development was increased (rather than responsibility).

In the same manner as job and task enlargement, I recognised that some of the new MIS technology (both hardware and software) would replace jobs and tasks at all levels and, as a consequence, work patterns may have to be redesigned. This included the earlier example of a word-processor operator or typist carrying out DTP tasks or training storemen to use a computer workstation.

RESIGNATION OF THE WQ MANAGER

On receiving an offer of alternative employment, the WQ Manager left Thermo-X in June 1997 and it may be beneficial to briefly discuss the impact of his departure on the change process. The WQ Manager was well-liked and trusted by employees. He had great empathy for staff on the shop-floor, (having had substantial industrial steel-works experience as an apprentice and foreman) whilst maintaining a full understanding of the managerial and commercial aspects of a small manufacturing company. His implementation of ISO9002 into the company enhanced inter-department cohesion whilst assisting the company's corporate ambitions to explore and develop new markets and products.

The impact of his departure decreased enthusiasm for the MIS implementation as both the WQ Manager and I had constantly reassured staff regarding the impact of the implementation. My tasks were therefore made more difficult as I had lost an enthusiastic ally of the new MIS. The WQ Manager's extensive manufacturing experience complemented my IT and IS experience allowing us both to learn from each other. Furthermore, the WQ Manager's completion of a MSc in Quality Management degree whilst also working at Thermo-X allowed him to empathise with my situation as both employee and researcher. However, I concentrated my implementation efforts on ensuring that momentum in the MIS was not lost. I spent additional time with staff in an effort to discover if any jobs or tasks could be enlarged or enriched.

4.7 Formation of the model: feedback from colleagues

My experiences at Thermo-X were used to formulate a conceptual model, which will be fully discussed in the next chapter, for successful implementation of Management Information Systems into SMEs. The first iteration of the model was proposed after I had spent just three months at the company. In order to gauge acceptance of the model, I elicited the views of several organisational members and asked them to review and comment on the model and its constructs.

In order to accommodate a cross-section of views and opinions, I selected staff from different departments: a Storeman/Quality Inspector, a word-processor operator /receptionist, the WQ Manager and the works foreman. As the WQ Manager left the organisation in June 1997, a new accounts assistant, who was appointed in March 1997, agreed to participate in appraising the model.

The comments from these staff were used to amend and refine the model, discussed in chapter 5. As will be detailed in chapters 5 and 6, the final version of the model was shown to staff at the external organisations. The views and opinions from these organisational members were used to refine the model yet further.

4.8 The new Thermo-X organisational culture and structure

My ethnographic experience and the refined conceptual model was applied to the IT project being carried out at Thermo-X. Any change in organisational culture and structure would effectively be MIS-led, as the technology would act as the catalyst for change. Many changes have occurred to take the company from its old culture to its present cultural state. These are best reflected by way of a table (table 4.4) which can compare and contrast different aspects of the culture.

The previous hierarchical organisational structure of Thermo-X now encompassed workgroups, allowing fuller coordination within all departments. De-centralisation of the new MIS has enhanced task and job variety. Efforts in flattening the organisation's structure, allowing the formation of workgroups, have increased self-management. These new autonomous groups now utilise employees to their full potential whilst retaining the flexibility to adapt to and adopt new practices and procedures.

Team working is now an integral feature of the company. "Cell teams" deal with as much of a received order (from receipt of order to its fulfilment) as possible. These teams are normally free to talk to the customer and can schedule and prioritise orders and purchase any materials necessary.

OLD Thermo-X Culture	NEW Thermo-X Culture
"Tall" organisation structure which was autocratic	"Flat" organisation structure which is more autonomous
Information used for managerial control	Information used to aid team problem-solving
External control mechanisms (for example, MD)	Internal control mechanisms with self-regulation of groups
Employee regarded as being "expendable"	Employee regarded as a "vital cog in the company wheel"
Maximum breakdown of tasks, involving relatively simplistic and narrow skills	Optimum breakdown of tasks, involving a much broader range of skills
Employee regarded as an extension to a machine	Employee regarded as being complementary to a machine
Managers monitor, control and evaluate	Managers facilitate, mentor and plan
Company comprised of one-person "building blocks"	Company comprised of self-managed groups forming "building blocks"

Table 4.4: Thermo-X Cultures: Old -v- New

Following efforts to flatten the organisational structure, the new Thermo-X structure in September 1998, can be depicted as figure 4.7. Despite concerted efforts by the WQ Manager and I, we found it impossible to "flatten" all hierarchical levels. For example, the MD's role is still central to the Thermo-X and, as such, he has full control over all departments. In the interests of accurate research, this deviation has been retained and depicted in the new schematic.

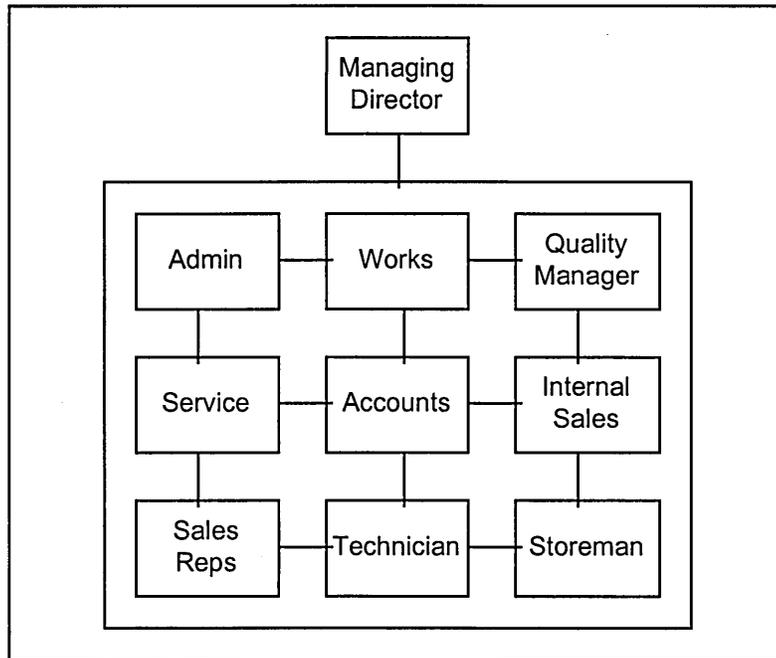


Figure 4.7: Management Structure, Thermo-X Limited, September 1998

4.9 Conclusion

My thirty-month involvement with Thermo-X has demonstrated that the organisation had previously been run under the sole leadership and direction of the MD. No other person within the organisation had any recognisable input into daily corporate operations and decisions. Furthermore, it was the consensus of opinion of employees that, in order for the firm to grow, the culture and internal organisational procedures had to be changed in order for any IT implementation to be successful.

Many employees had been of the opinion that they had been asked to carry out more and more tasks, often quite major, without an associated increase in resources or recompense. This had led to shortcomings in quality, delivery, service and ineffective and inefficient internal communications.

This chapter has described many organisational and cultural initiatives that were undertaken at Thermo-X and has analysed their success, their impact on staff and changes in work system design. Several changes have taken place which have transformed the culture of the organisation. These have been compared by way of Table 4.4.

The Thermo-X ethnographic study has revealed several elements or **propositions**:

- desire to implement a company-wide Management Information System
- employees opposed to a wide-ranging implementation
- employees unconvinced of the merits of a Management Information System
- technophobic employees who are unsure of the impact of the new technology
- the importance of recognising that the above problems exist
- the importance of IT education to bring down barriers
- the usefulness of IT Pilot Schemes, Communication, Dissemination, Training and Mentoring throughout the change process

These propositions will be used in the next Chapter to form the basis of a new conceptualisation of organisational culture-change. The next chapter will explore whether Thermo-X's previous experiences of bad culture are typical of UK-based SMEs. If so, the chapter will investigate whether the experiences of culture-change at

Thermo-X can form the basis of a generic culture change structure for SME companies wishing to introduce a Management Information System.

5.0 Conceptual Model for MIS implementation

5.1 Introduction

This Chapter will consider the relationship between organisational structure, organisational culture and Information Technology. The Thermo-X experience will be used as a foundation on which to propose a Conceptual Model for successful implementation of Management Information Systems. I will discuss how the influence of an organisation's founder (and/or leader) can have an overwhelming effect on the resultant culture of the organisation and will also examine how the organisational culture of a UK SME can be formed, re-engineered and sustained.

5.2 The Thermo-X Case Study: Implications, Theory and Practice

On a simplistic level, the organisational and cultural problems at Thermo-X can be summarised as follows:

- (i) the desire for the MD of Thermo-X to implement a company-wide Management Information System,
- (ii) several Thermo-X employees are opposed to such a wide-ranging implementation and are unconvinced of its merits and
- (iii) several Thermo-X employees are technophobic and are unsure of the impact that the new technology will have on their existing, familiar working practices and, ultimately, their positions.

These three organisational and cultural problems highlighted at Thermo-X may well be typical of many UK SMEs. Having acknowledged these problems, the Thermo-X MD and Works and WQ Manager have further recognised that these problems have to be overcome in order to successfully accept the proposed new technology. A variety of techniques have been used in an attempt to "sculpt" the Thermo-X culture in readiness for the impending IT changes. The techniques involved have been as diverse as communication, mentoring, dissemination of progress and planned activities and the use of IT pilot schemes.

Besides these techniques, as always in small companies, a substantial personal element was involved. Patience played a pivotal role in the Thermo-X culture-change process. It was recognised that the fear of technology involved overcoming the resistance to a change in employees' comfortable and familiar work patterns. In many cases, these patterns were so deep-seated that only a gradual change process would have succeeded. The sudden imposition of a cross-functional Management Information System would not have produced the necessary outcomes and may have only succeeded in pushing back the culture-change process several steps.

It was further recognised that the culture-change programme was not a one-man process. For success, the process would require full and active participation from all Thermo-X employees. Issues to be addressed included which culture-change mechanisms to use, whether the organisational conditions at Thermo-X would have a bearing on the chosen techniques and procedures, whether one methodology would be rigidly adhered to or whether a blend of tools and techniques would be used.

I will also discuss how the experience at Thermo-X has shown that existing culture and organisational change mechanisms may not be suitable in all cases and will detail how aspects of established culture and organisational change models (described in Chapter 2) were used at Thermo-X whilst additionally highlighting new approaches that have been omitted or overlooked in established research.

Lewin's [1952] three-phase culture change model starts with *unfreezing*, a state demonstrated by the Thermo-X management acknowledging that a culture change was necessary. However Lewin's [1952] hypothesis that employees are free to question and challenge the impending changes did not take place at Thermo-X due to employees fearing the MD's reaction to their challenges.

The unfreezing process moves on to *change*, when new procedures and processes are introduced and the outgoing procedures openly castigated for their shortcomings, allowing the new incoming procedures to be promoted. At Thermo-X, this stage was relatively simplistic as the old system had numerous shortcomings which increased with time and changes in regulations (such as Accountancy, Legal, Business). All incoming procedures were imposed by the MD.

The *change* process leads on to the *re-freezing* process where, having been trained in the new procedures, employees are left to work the new system by themselves. Again at Thermo-X, this stage revolved around the MD's insistence that the new system be used although training was provided to facilitate acceptance of the system. Staff take-up and enthusiasm of the new system varied according to age, experience and levels of scepticism (due to the limited success of previous IT implementations at Thermo-X) of different employees.

Schein's [1985] model suggests that the organisational culture change process operates at three-levels, starting with *birth and early growth*, (where culture is recognised as a key element of the organisation). At Thermo-X this recognition grew, developing into "managed revolution", with its involvement with the Teaching Company Scheme resulting in both internal and external consultants (usually previous Thermo-X employees being employed on a short-term consultancy basis) managing internal concerns over the impending change.

Birth and culture leads to *organisational midlife* at which a stable culture is achieved. The Thermo-X approach was to use IT pilot projects to establish and sustain new working practices. The final stage of Schein's [1985] model recognises that long-term change is difficult and takes the form of three phases: *coercion* (where management force through the change process), *turnaround* (a mix of unfreezing, change and re-freezing) and *re-organisation and re-birth* (where the old culture of the firm has been disassembled, re-organised and the new procedures and operations "re-frozen" within the organisation). At Thermo-X, this phase was typified by:

- (i) management forcing how the impending change on those employees reluctant to change their operational procedures,
- (ii) a recognition that the existing culture was inappropriate and that new procedures were needed and
- (iii) changing and "freezing" the new culture.

Lundberg [1985] postulated that in order for cultural change to occur, two external conditions are necessary: (i) *Domain Forgiveness* (the organisational threat posed by factors such as competition and resources) and (ii) *Organisational Domain Congruence* (the degree of harmony between an organisation and its domain). In addition, Lundberg [1985] submits that the organisation wishing to undergo cultural change should possess the following characteristics:

- (i) *Sufficient Change Resources* (such as money, time and energy),
- (ii) *System Readiness* (a sense that people are ready to change),
- (iii) *Existence of Co-Ordinative and Integrative Mechanisms* (allowing for effective communication) and
- (iv) *Stable Leadership Team* (possessing sufficient strategic vision and skills to guide and monitor the change process).

The Thermo-X experience generally met these requirements but, emulating conflicting demands characteristic of many SMEs, Thermo-X only displayed aspects of these characteristics according to limited availability of resources.

Lundberg's [1985] theorises that an organisation is more inclined to change if it is faced with certain challenges (or *precipitating pressures*) which can take one of four forms:

- (i) *Atypical Performance Demands* (such as increasing productivity),
- (ii) *Stakeholder Pressures* (originating from institutions having valid interests in the organisation),

- (iii) *Growth/Decrement Pressures* (pressures arising from the growth or down-sizing of the organisation) and
- (iv) *Crisis Perception* (such as the deprivation of financial resources).

At Thermo-X, *Atypical Performance Demands* took the form of increasing productivity and increasing costs, *Stakeholder Pressures* normally included such aspects as meeting the requirements of shareholders (the MD and his family who also had financial interests in the firm), Senior Management and financial institutions, *Growth/Decrement Pressures* (the concern that, to compete effectively, Thermo-X could not stay at its current size and must expand), and *Crisis Perception* (the concern that action regarding IT must be taken to maintain and increase existing market share).

The model requires a *triggering event*, an occurrence which acts as a catalyst for change, which motivates the firm to change its culture. For Thermo-X, this event was the need for Thermo-X to compete effectively within the industry and would come under the sub-section of a triggering event known as *External Revolutions*.

Dyer's [1985] six-stage theory starts with (i) *Leadership ability*, the need for management to recognise that a culture change is necessary according to their perception of external factors. At Thermo-X, this was the realisation that management required a more effective competitive presence within the industry.

The second stage is (ii) *Breakdown* where the existing working practices within the organisation are gradually broken down. The experience at Thermo-X was to introduce doubt in the existing practices whilst preparing staff for the impending change.

The third stage of this model concerns (iii) *New Assumptions* where the old culture is removed. My involvement at Thermo-X formed a major part of this stage as the pre-conceived notions of management and staff had to be altered before moving on to (iv) *Conflict*. My presence at the firm was met with open hostility by some members of the organisation who were unwilling to relinquish their existing working practices.

Having coped with this difficult phase, the next stage revolves around (v) *Crisis Resolution* where tensions over the previous stage have been resolved, the credit for which goes to the instigator of change. Unfortunately, this phase was overlooked at Thermo-X at the MD's insistence that organisational procedures should be introduced quickly. As a result, progress on the implementation was increased but my introduction and subsequent explanation of roles, tasks and duties was very limited. Talking to and reassuring staff should be regarded as a key step in gaining the trust of employees.

The final stage of Dyer's [1985] model is the removal of those employees who are not wholly committed to cultural change. During the organisational and cultural change process at Thermo-X, there were several early staff sackings and severe reprimands to many of the remaining staff. Several remaining employees openly questioned the validity of these sackings, arguing that a "last-in, first-out" policy should have been used. In other words, why was I allowed to remain? The MD explained that my role was important to the implementation process but some employees remained sceptical perhaps thinking that if I had not been employed, would their colleagues have been removed? Gaining the trust and cooperation of these remaining employees became even more difficult.

Gagliardi [1986] advocates a gradual, incremental, culture-change process, arguing that a harsh approach reaps little benefit. The four major stages of his approach are *leadership vision* (demonstrated at Thermo-X by managerial dissemination of their beliefs down throughout the organisation), *belief confirmation* (where Thermo-X management's cultural vision was subsequently proved and, again, shared through the organisation), *belief focus* (Thermo-X employees encouraged to look beyond the effects of the new regime and to visualise the reasoning behind the new culture) culminating in *shared values* (where, as a result of the preceding techniques, Thermo-X employees came to support the new culture).

5.3 The Justification for a New Model

In Chapter 2 (Section 2.5, Critique of the Cultural Models: Personal Perspectives on Change), I submitted that existing models may be more suitable for some organisations and less suitable for others. This did not, however, reduce their usefulness in the culture-change process. A review of the literature and the inherent issues involved demonstrated the different cultural basis that established researchers (such as Hofstede [1994b], Lundberg [1985], Schein [1985, 1990], Dyer [1985], Gagliardi [1986] and Lewin [1952]) have used. I argued that, although none of them may be inherently wrong, we may not always know which one is correct or whether one is better than another.

I further suggested in Chapter 2 that the ideal cultural change model may well be a skilful blend of the most pertinent tools and techniques from the existing range of cultural and organisational change models. Although many established models exist (see Section 5.2), their suitability is generally for circumstances and situations of relevance at the time of their inception. Their applicability to contemporary scenarios may be inappropriate as many organisational, technical, cultural and social evolutions may have occurred since.

Having reviewed various existing culture-change models, (and having briefly discussed their applicability and validity for Thermo-X), I would say that, during my ethnographic experience, no one mechanism was used in its entirety. Instead, a blend of various tools and techniques spanning all of the models was used as some established techniques were not applicable to Thermo-X.

The proliferation of IT during the 1980s, as reported by Sherman [1985], impacted strongly on the perceptions of business managers. In this regard, the often tempestuous relationship between Business and IT should also be considered and the Thermo-X organisation replicates this view. Throughout the 1980s, Thermo-X management acknowledged the importance and role of IT within the company. Employees and management were unwilling to adapt or change familiar working practices to fully accommodate the needs of the new technology.

Researchers and authors [Sherman, 1985; Hirschheim, 1985; Noori, 1988] have confirmed that, throughout the 1980s, many technically-oriented staff have been employed by organisations similar to Thermo-X. These authors argue that there has often been a severe gap between these technically-oriented staff's recommendations to non-technical management and the perceptions and expectations of non-technical managers.

Ward & Peppard [1995] refer to a cultural gulf between management and IT staff encompassing the notion of sub-cultures. Traditionally, the IT function was regarded as just another department within the evolving organisation. In reality, the culture of the IT department may be geared towards achieving strategic growth through the use of contemporary IT techniques whilst management, who would be privy to - and perhaps governed by - financial constraints, would be content to expand on existing legacy systems ill-suited to achieving contemporary corporate goals.

The IT-Business cultural barrier, described by Ward & Peppard [1995], was resolved to a certain extent by the advent and increased popularity of outsourcing the IT function. Outsourcing presented managers with the opportunity of demanding tangible deliverables. Additionally, managers could ensure that these were achieved by threatening to withhold payments.

The issue of whether it is managers who dictate resource allocations to IT departments or if IT staff should suggest appropriate solutions to management is more complicated. From the literature and experience at Thermo-X, the best solution would appear to be hybrid in nature. Therefore, an appreciation of how both the business and IT side of the organisation interact is appropriate.

The ideal scenario may well be one where management, in conjunction with the technical specialists, dictate the IT strategy and recognise the organisational and cultural barriers faced by appropriately-trained technologists. Likewise, I would suggest that IT specialists should attempt to integrate their recommendations with the strategic objectives of managers. This outlook proposes that *reciprocation* is the key to successful implementation of technology.

I would argue that the recognition of the existence of previously shrouded problems and issues, with the additional recognition that these issues may be at the very core of organisational difficulties, can be regarded as a major step forward. However saying and doing are, of course, vastly different. The mere recognition of problems is futile unless a valid attempt is made to rectify them whilst promulgating the issues behind them.

It is these issues which necessitate a new Organisational Culture-IT framework, a framework which, although having its foundations in established cultural models, embodies findings from an extended ethnographic case study. The constraints of established theoretical models can thus be fused with those endemic elements to produce an exploratory and explanatory conceptualisation of a contemporary Small Business.

I will now go on to discuss the issues involved, including which facets are of particular relevance, whether techniques are to be actioned in a particular order, whether elements are etic or emic in their applicability and the ramifications of the UK-based SMEs angle.

Furthermore, I will examine the inherent issues or requirements in the running of such a business which should be properly acknowledged in the framework. Additionally, I will contemplate whether any discernible patterns emerge which point to a generic model for successful change.

These issues confirm that, because of the factors involved, any new solution cannot be purist or dogmatic in its nature or outlook. The factors involved are not just characteristic to the disciplines of Management and Information Technology but are also induced from and informed by areas as diverse as Psychology, Politics and Sociology. Recognising that the new approach encroaches on seemingly dissimilar, non-homogenous, subjects will be an integral part to its acceptance and subsequent usefulness.

5.4 The Formulation of the Model

The previous section indicated that the differences, both actual and perceived, between seemingly disparate disciplines is of paramount importance and provides a balanced perspective to a proposed model. The framework which will be developed takes a holistic view, adopting the stance that IT-influenced change is a dynamic and far-reaching process and, unlike existing culture-change models, should not be reduced to a linear concept.

In this regard I feel it would be beneficial to provide some detail of how the model was formed and, of particular interest, how a specific IT methodology was used to formulate an accurate depiction of the culture-change process.

5.5 The Role of Soft Systems Methodology (SSM)

This section will briefly discuss how specific precepts of accepted Systems Methodology were used to aid formation of the Conceptual Framework. It is not the intent of this section to discuss in great detail the complexities of any methodology but rather to focus on those elements which are of relevance and special interest.

Systems Analysis and Systems Design, although often confused as one and the same thing, are quite distinct from one another. Edwards [1985] clarifies this issue stating that, whereas Systems Analysis refers to the process of gathering information to make improvements to the system, Systems Design refers to the process of planning a new system.

Edwards [1985] provides a schematic which distinguishes between Systems Analysis and Systems Design which also depicts the key role of the user in the whole process [Figure 5.1]. The ethnographically-informed experience at Thermo-X confirms the above model as users of the potential IT system provided key data at both the Feasibility and System Specification stages. Additionally, cultural barriers and structural difficulties became apparent at these stages.

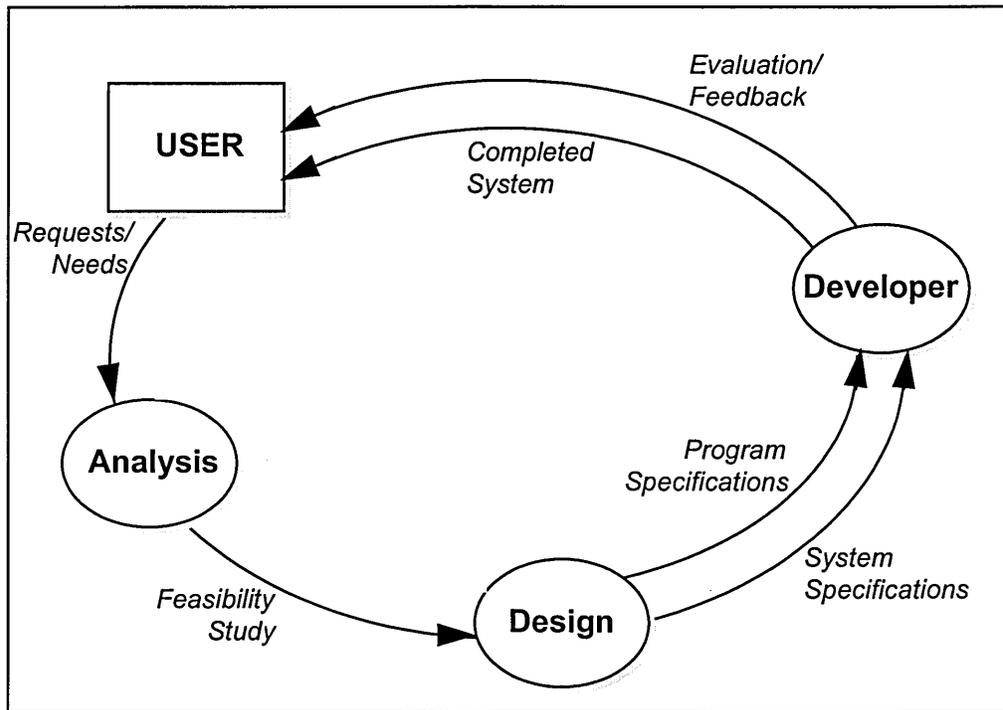


Figure 5.1: Analysis and Design - User Involvement

Soft Systems Methodology (SSM) was developed in the 1970s [Checkland & Scholes, 1990] through Action Research into Systems Engineering. Generic Systems Theory attempts to understand the *nature* of systems and more traditional scientific analysis techniques, such as Structured Systems Analysis and Design Methodology (SSADM), separate a complex situation into constituent parts for more detailed analysis.

However this technique is better suited to more technical methodologies. Its applicability can be limited and inappropriate in managerial sciences and related subjects. A major foundation of soft systems thinking revolves around a *gestalt* way of thinking, postulating that the whole is greater than the sum of the parts.

Checkland & Scholes [1990] report that Hard Systems Analysis techniques, such as SSADM are more concerned with *how the problem should be solved* whereas Soft Systems Analysis concerns itself with the options for improvement, or the *what to do* question.

In hard system methodologies, a goal is assumed. Hard systems are concerned with the *how* of the problem whereas, in Soft Systems, *missions* - rather than goals - are assumed. The Soft Systems approach to analysis supplements the information received by other, more formal, analysis techniques.

This additional data can greatly assist analysts in all stages of their work. As I have already stated, it is not my intent that this section be a narrative on the complexities of SSM but, to aid understanding, I will briefly outline SSM's main features, taken from Checkland & Scholes [1990] :

- SSM is a participative approach but is of immense value when this participation is reduced.
- SSM provides a set of guidelines for examining an organisation with the prospect of identifying possible improvements.
- No strict adherence to rules is necessary, other than the nominal rules which embody the methodology.

- SSM makes a distinction between the *real* world and the *abstract* world (as illustrated in Figure 5.2)
- Many of the techniques executed by Soft Systems Analysts are nothing more than glorified fact-finding methods, common in other systems methodologies.
- The techniques do not necessarily have to be executed iteratively
- The methodology encourages the user to look at the problem from more than one viewpoint.

Soft Systems techniques therefore revolve around the examination of human activity and its importance in the analysis stage. Given that human behaviour is largely unstructured, tasks are not always executed according to pre-set procedures. Human nature is such that everyone has their own way of doing things.

This difference, when extended to the relationships between individuals, and the fact that humans - unlike machines - are not infallible and may become ill, feel nervous or have "off days", combine to potentially detriment the performance of the "human machine".

Human activity, particular in turbulent organisational cultures, is a complex process and I would argue that, if the "scientific" method is forced into such an organisation, an important product of the analysis process, which I will loosely call "the human element", may be lost.

Given the potentially "open systems" nature of organisations, the relationship between the organisation and the external environment is thus of vital importance and any

Downs [1992] provides an interesting schematic (reproduced in Figure 5.2). For the purposes of my thesis, it is unnecessary to codify the contents of each schematical "blob" as I have provided the diagram to depict the inter-relationship between the real world and the abstract thinking therein.

The diagram makes clear the interaction between the real and the abstract world. Real world scenarios and actions (depicted as 1 and 2) cross over into the abstract (or theoretical) world in order to form (by way of the Root Definition) the basis of the Conceptual Model. This Model then re-crosses the real-abstract boundary to be verified and validated.

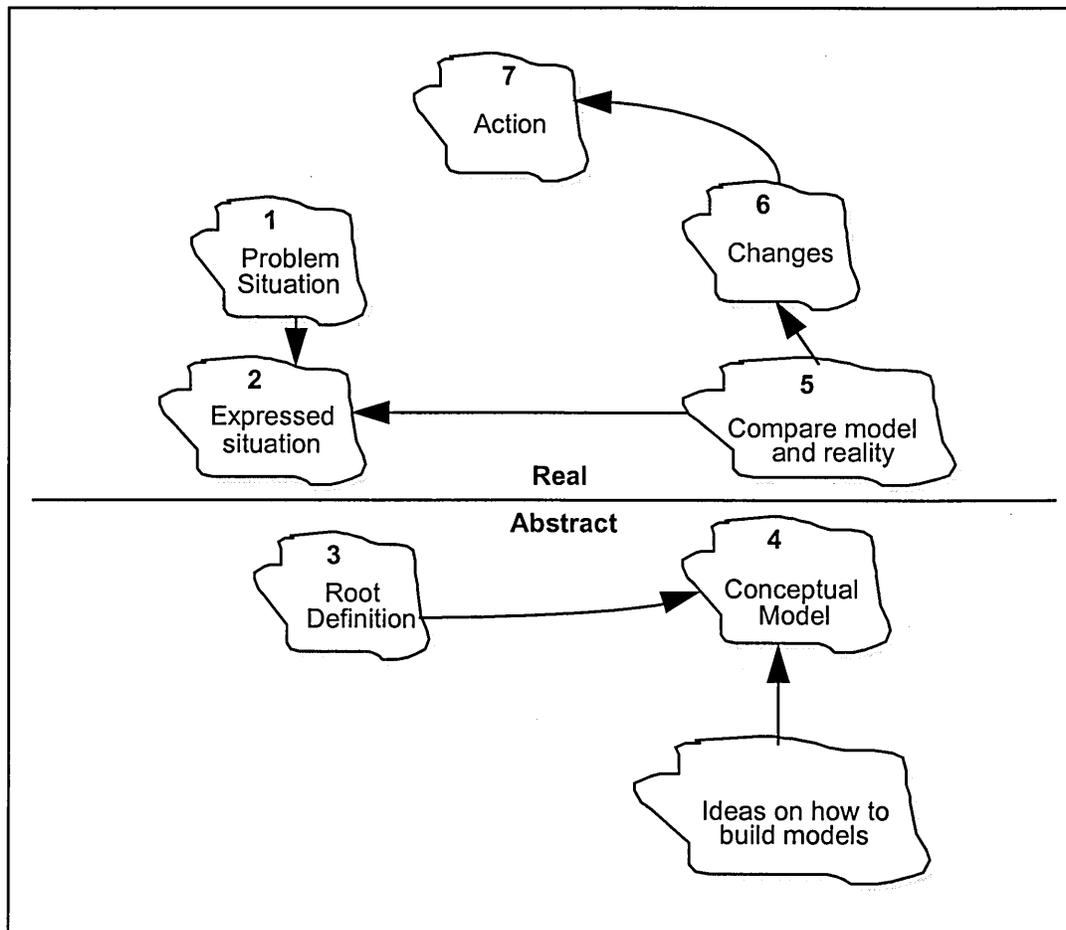


Figure 5.2: Real versus Abstract Worlds

5.6 Building Blocks of the Model

The literature surveyed so far has been extremely limited in its outlook and applicability to UK-based Small-to-Medium sized Enterprises. The need for a generic strategy is confirmed when the mentioned shortcomings are coupled with the introduction of new technology into these same firms.

Existing knowledge has been combined with ethnographically-informed data from Thermo-X in order to form a conceptual model for the successful implementation of Management Information Systems into UK-based SMEs. The new model fuses theoretical work carried out by established researchers with the collected results from the 30-month ethnographic study at Thermo-X.

The framework's intent is to facilitate the concept and understanding of the study's objectives which were:

- (i) To establish and assess the *cultural and organisational aspects* of implementing IT (specifically a Management Information System) into a UK-based SME
- (ii) To investigate how such a firm can effectively use an implementation strategy to convert itself from a *reactive* organisation to a *proactive* one and
- (iii) To consider the role of management during the change process and to evaluate top-level and peer-support.

It was my original intention to use Lewin's [1952] three-phase culture-model (Figure 5.3) as a core of the new conceptual model but, on closer analysis, I realised that the processes would be too linear and unsuitable to the fast-moving and dynamic nature typical of many UK-based SMEs. By extension, Lewin's [1952] model would apply to more stable organisational environments and its applicability to the ethnographically-informed data is therefore perhaps more theoretical.

However its usefulness as a general introduction to change management is invaluable. Its general outlook is correct in conceptualising change as an "Unfreeze, Change, Re-freeze" process but I would say that its applicability to UK SMEs is limited. It is my contention that the inherent beliefs, attitudes and values [Williams et al, 1993] undergoing the change process are dynamic in nature and not linear.

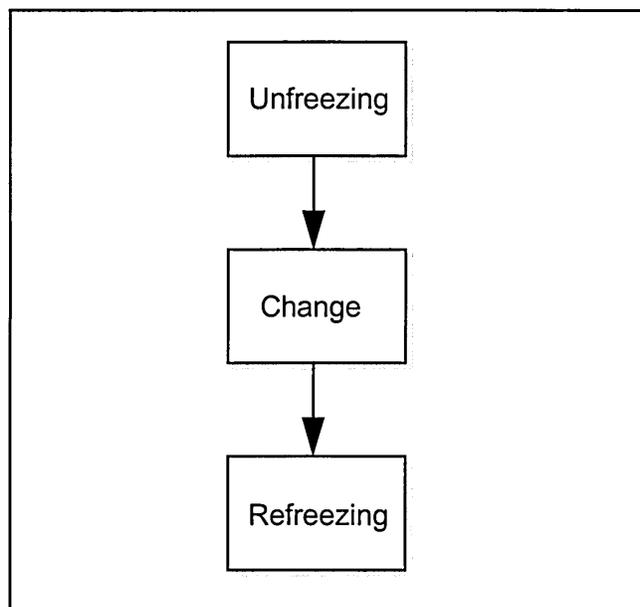


Figure 5.3: Lewin's three-phase model

Instead of Lewin's [1952] model, the new framework will coalesce the seminal theories of Dyer [1985] and Gagliardi [1986], using the result as a foundation. A combination of these two works is necessary because I feel that these two theories work can work in tandem. Facets of each theory, (such as Dyer's [1985] thoughts on Breakdown, Conflict and Crisis Resolvment and Gagliardi's [1986] emphasis on a gradual, incremental change highlighting the importance of belief focus and shared values) have relevance to the needs of Small to Medium sized Enterprises.

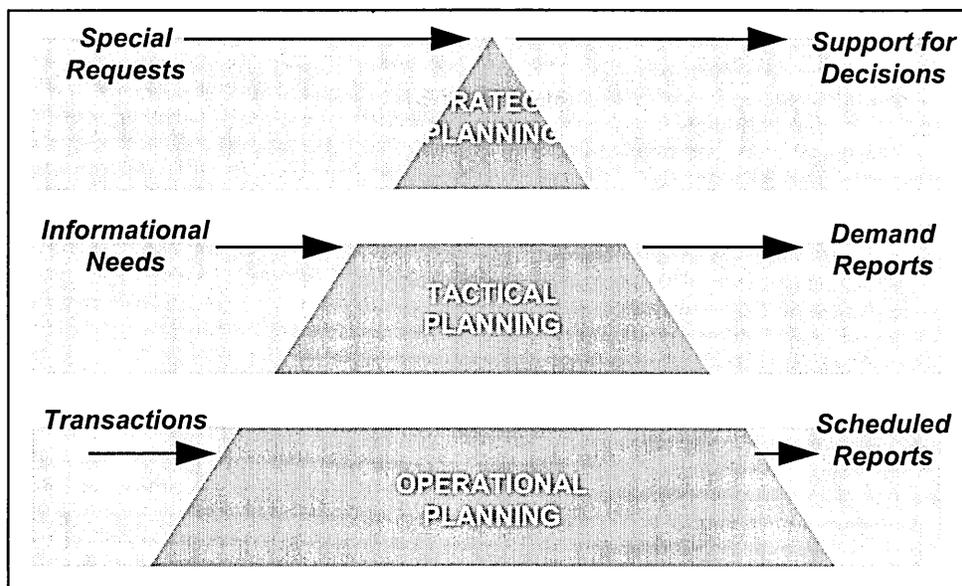


Figure 5.4: Activities and Framework for an organisation's IS requirements

Having tackled the organisational culture angle, I will then apply the points (discussed in Chapter 2) regarding the impact of Management Information Systems. I return to Anthony's [1965] diagram (Figure 5.4), also put forward in Chapter 2, showing the relationship and interaction between data, information and the respective "platform" levels of operational planning, tactical planning and strategic planning.

With this diagram in mind, I move on to Gagliardi's [1986] concept of the Virtuous Circle (Figure 5.5). In Gagliardi's [1986] diagram, values are delivered from the idealisation, of a collective experience, which in turn leads to stabilisation, cohesion and, ultimately, competence. The stage where a state of cohesion is attained can then be applied to overcoming new organisational issues. The shared culture which is formed as a result of the Virtuous Circle exhibits elements of both unification and competence.

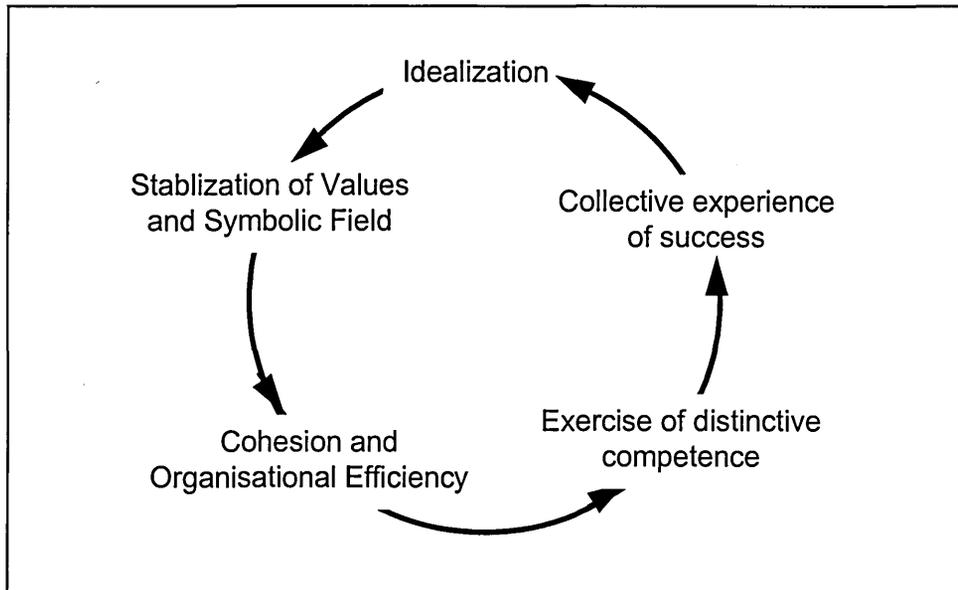


Figure 5.5: Gagliardi's Virtuous Circle

In this manner, the state of the Virtuous Circle has been attained. In this regard, Gagliardi's [1986] thinking is shared by Pressman [1992] whose Waterfall model (Figure 5.6) depicts the stages of Analysis, Design, Coding, Testing and Maintenance in the Software Development Life Cycle and highlights the role of feedback.

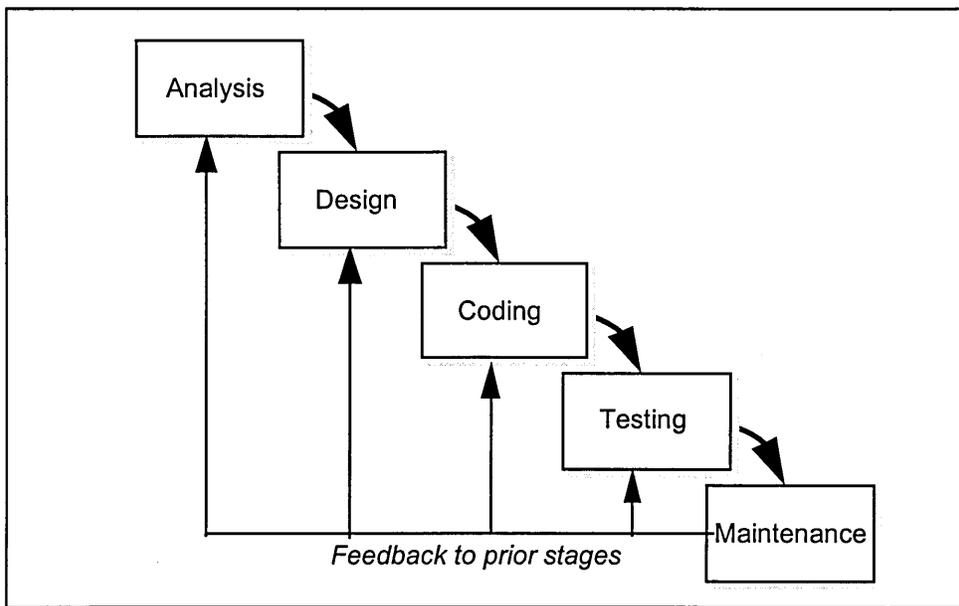


Figure 5.6: The Waterfall Model

The ideologies and values of "continuing the loop" (the Virtuous Circle) and the acknowledgement of feedback (Waterfall model) will form a key part of the new Model.

5.7 MIS-induced Culture Change: MISCO Conceptual Model

Before entering a full discussion of the stages of the proposed MISCO (Management Information System Culture-Organisation) Model, it would be beneficial to provide an overview of the major proponents. The first stage is for management, either independently or after meeting external consultants, to *recognise* that change is necessary [supporting Dyers' [1985] *Leadership ability* theory].

Once this key stage has been acknowledged, inroads can be made into changing the existing culture (Gagliardi's [1986] *belief confirmation* - (and dissemination) and a combination of Dyer's [1985] *Breakdown, New Assumptions* and *Conflict* stages) culminating in Gagliardi's [1986] *shared values* and Dyer's [1985] *Crisis Resolution* stage. Once this final stage has been completed, the new operational procedures can be effected.

5.7.1 Recognition

Lundberg [1985] observes that many UK-based SMEs are likely to face a range of external pressures. Applying the concept of these pressures specifically to the area of Management Information Systems, I would offer, as examples of pressure, the replacement of legacy systems (perhaps because of reduced functionality in light of corporate ambitions) or the need to meet Y2K (Year 2000) compatibility, an important issue at the time of writing.

I would furthermore state that these same pressures may mean the organisation changing the way its internal processes and procedures are carried out. Established culture-change authors [Lundberg, 1985; Schein, 1990; Dyer, 1985; Gagliardi, 1986; Lewin, 1952] agree that these changes almost always face resistance from staff within the organisation.

I would add that resistance to impending change may not always be of human origin. It may be the case that the existing physical infrastructure (ie. unsuitable workshop layout for automated manufacture techniques) or internal working procedures within the organisation may be incapable of accommodating the proposed change.

Work by Manchester Open Learning [1993] shares this way of thinking and demonstrate that resistance to change can take one of two forms: organisational resistance or human resistance. Examples of organisational resistance cited include unsuitable structure, ill-defined corporate objectives and poor communication.

A fear of the unknown, a lack of understood beliefs, lack of trust, self-interest and disrupting established routines are given as examples of human resistance.

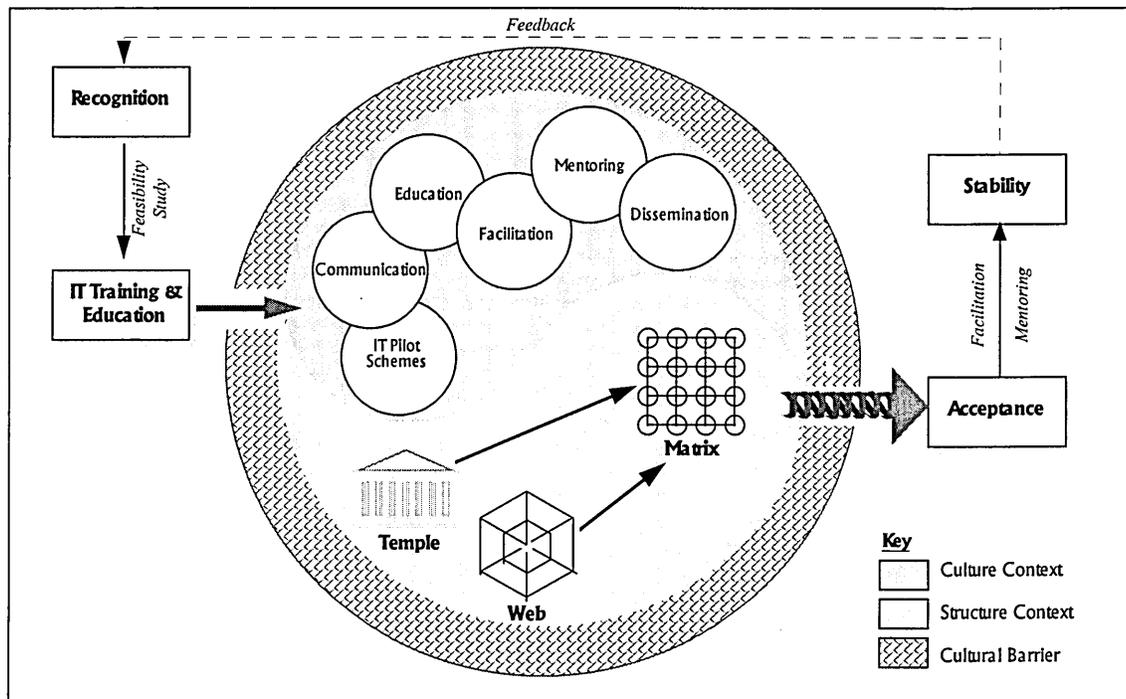


Figure 5.7: Conceptual Model

The proposed MISCO model is illustrated in Figure 5.7 and begins with recognition that the organisation must change (usually in light of internal and external pressures). This opens the door to full and frank discussion between all members of the organisation regarding the feasibility of the new computer-based Management Information System.

5.7.2 Penetrating the Cultural Barrier

Once it has been agreed that adoption of the new MIS is strategically correct, work can begin on identifying key areas of the organisation where "attitude, belief and value" change will be crucial to the success of the System. Identifying these departments or employees is of paramount importance as this forms the "cultural barrier" which must be penetrated in order, if necessary, to change accepted and familiar internal processes in preparation for the new System.

The identification of these departments or persons should be followed by a definition of the extent of training and education required in order to facilitate the penetration of the cultural barrier. It should be emphasised that the *penetration* of this barrier is perhaps the easiest phase of the culture-change process (Figure 5.8)

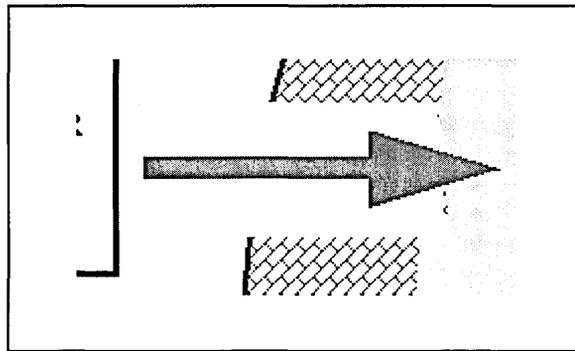


Figure 5.8: Penetrating the Cultural Barrier

Metaphorically, I would say that a small ingress into established procedures has been granted and the change-manager (or team) must now ensure that this accessibility is fully exploited. The "entrance" should be treated as a "window of opportunity" and should not be taken lightly.

As an incidental point, I would add that using an internal change consultant greatly facilitates the acceptance of the overall change programme. Or, somewhat simplistically, a case of familiarity breeding comfort. My early time at Thermo-X was spent going around each department in turn, introducing myself to each member of staff.

Whilst the openness of this approach was welcomed by the majority of staff, it undoubtedly aroused suspicion in others, their fears confirmed and possibly compounded on closer questioning of my exact role. The use of an external consultant, who would not have been permanently based at Thermo-X, may well have increased this suspicion and exacerbated fears.

5.7.3 Change from within: A blueprint for success

It may be beneficial to bring together the major proponents involved in the form of a blueprint for successful implementation of Management Information System in SMEs. The path suggested is a combination of established research findings combined with novel contributions from the ethnographic experience at Thermo-X.

It is my view that the *mechanics* of the change process in SMEs is non-linear in its outlook and the multi-faceted approach, carries out many varied tasks simultaneously (as depicted in Figure 5.9). Regarding the points raised in Section 5.7.1 concerning human and structural change, it would be beneficial to discuss the complexity of the issues involved.

Concentrating first on human resistance, it should be recognised (by the change manager/team) that change is often a difficult concept for employees to accept. Questions are bound to arise over whether the impending change will adversely affect an employees' established working routines or whether in fact the change will significantly reduce that employee's role and ultimately threaten their employment.

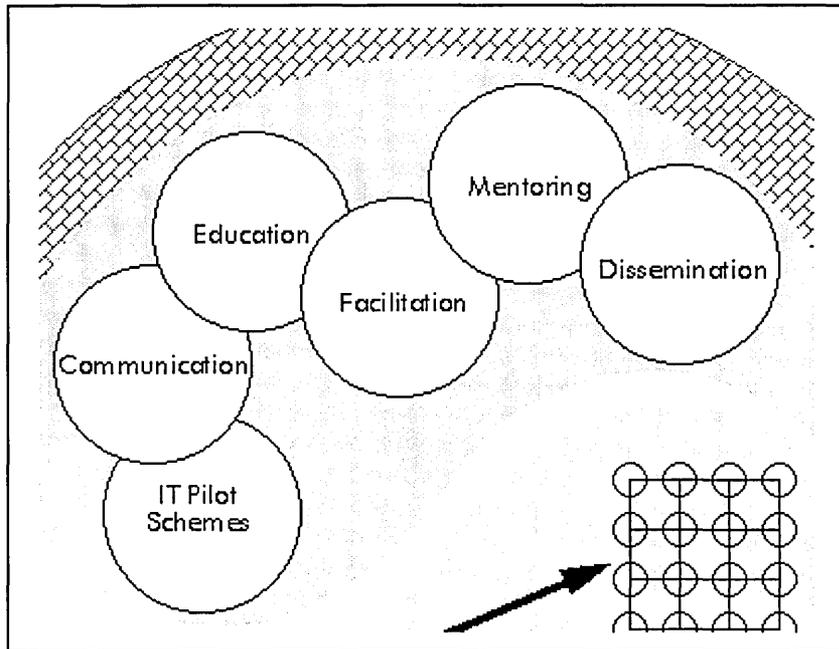


Figure 5.9: Changing Culture

The hypothesis that people fear the unknown, or what they do not fully comprehend, is synchronous to the notion of people fearing change as they may be unsure as to the consequences of proposed change on their daily lives.

A wide range of emotions are involved. The literature and my experience show that, of these emotive traits, fear, confusion, trepidation, stress and argument are commonly exhibited. In order to progress satisfactorily, the change manager should be fully aware that the key to overcoming these fears is support.

The change manager should support and empathise with employees throughout the change process, recognising that some employees may well fear the impending change, perhaps feeling that their employment is being threatened. The extent of support will vary according to the magnitude and complexity of the change programme involved but the emotive issues involved should be tackled considerately.

As mentioned, the emotive issues involved include fear (encompassing the arguments concerning fear of the unknown), trepidation over the learning curve involved in familiarising themselves with the new computers system (and any associated new procedures). This then impacts on the feeling that the new system will encroach upon, and possibly erode, the established and familiar working procedures and practices which, up until the proposed introduction of the "new fangled" technology, had been quite appropriate.

Scepticism is a trait often displayed by employees which can manifest itself in the form of questioning the relative merits of the new MIS, being vehemently, and openly, opposed to its merits and citing previous, failed, attempts at introducing new systems, often at the same organisation. Rather than approach management or the change manager with any concerns, some employees may feel it appropriate to talk with other employees often exacerbating their fears in the process.

My solution to these displayed fears was to constantly reassure people that the new system would not suddenly govern their daily practices. The objectives of the new system would be to improve efficiency, productivity and, as a desired result, profitability. This was then seized upon by some workers, particularly on the shopfloor, who interpreted this as meaning that increased profitability would increase confidence in the system, perhaps reducing their hours or possibly eliminating their roles.

I compared the organisation to the engine of a motor car, saying that each part had an important role to play in making the engine work. If the oil or water levels dropped, so too would the performance of the engine. No part of the engine should be seen as less or more important than another as, if you remove one, the remaining components may cease to function. The simplicity of this comparison was appreciated by many members of staff who began to see themselves as tangible and valuable cogs in the corporate wheel.

Age and experience plays a vital role, as too does the level and extent of education. Many of the older Thermo-X employees displayed a "deja-vu" attitude of "been there, done that, worn the T-shirt...no good" regarding the new system which began to trickle down to the younger members of staff. This potentially never-ending cycle of negativity was arrested however by reassuring these members in a similar manner to their older counterparts.

This brings us to the subject of trust. My experience confirms that trust is a two-fold process. Firstly, trust placed in the change manager and secondly, relating to the trust placed in the system. Employee trust in me was achieved by a variety of techniques, such as socialising (discussed in Chapters 3 and 4). Trust in the MIS was achieved by adopting an incremental approach to implementation. Pilot IT schemes were introduced rather than taking a company-wide "big-bang" approach.

The usefulness and justification of these schemes was proved by improvements in efficiency, communication and Management Information.

Following on from this, I would say that the research clearly demonstrates the need for an internal change agent, or change management team. The intrinsic nature of a SME means that external consultants, be they associated with change programmes or not, may well be treated with suspicion. At best, staff may question the validity of external assistance, arguing that the organisation already possesses sufficient expertise. At worst, they may be sceptical of the change programme.

The Thermo-X experience also suggests that constant reassurance is an integral part of the change process. Whilst the MIS should be continually trumpeted as a benefit, the change agent should stress at all times that full human participation is of paramount importance as, without support from the people who will be using and running the system, the MIS cannot function. This should go some way in proving to the sceptics that the MIS will enhance, and not replace, their existing working practices.

Having examined the manifestation of human resistance, I will now move on to the role of the organisation's structure as this is also germane to the change process. Static structures may well be intolerant to adapting to a particular circumstance (in this case, proposed implementation of a MIS). In order to ensure success, structure must also be changed.

However, as in the case of humans, resistance can occur. Procedures may be so well established that moving to a new, unfamiliar, way of working will meet with resistance from the persons who will be operating the new procedures.

I would counter this approach by stating that if a modern small business is to thrive, it must attempt to change itself from a *reactive* state (where the organisation is not receptive to change and which reacts only when an external stimulus is applied) to a *proactive* one (where the firm is adaptable, change-ready and self-driven in its approach).

The anticipated advantages of introducing new technology into organisations [Lucas, 1990; Schultheis & Sumner, 1995] include the improvement of the organisation's efficiency and effectiveness. Hence, many of the cultural changes effected were allied closely to the transition to a matrix structure (Figure 5.10).

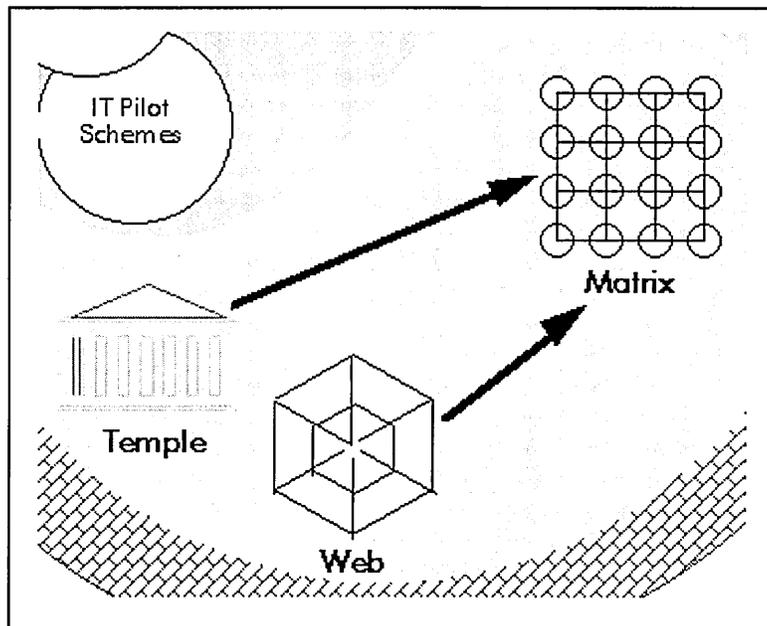


Figure 5.10: Changing Structure

The fast-moving commercial environment of a typical SME means that the organisation must be dynamic in its approach. Whatever the product or service involved, the many different stages and processes employed (design, analysis, production, testing) mean that the organisation must be flexible, communicative, functional and efficient.

The cross-functionality involved in matrix structures confirms the findings from the Thermo-X experience. Co-ordination of resources and tasks is improved and the structure encourages original thought, active participation and a focus on customer satisfaction [Carnall, 1995].

A metamorphosis of this nature is not easy and there are many complex issues involved. Attempts should be made to change the operational and procedural tiers (exemplified by the Thermo-X organisation structure depicted in Chapter 4) in order to flatten them as much as possible.

Reducing hierarchical levels (thereby cutting down on bureaucracy), empowering employees with expansion of roles, increased responsibility and accountability and introducing small, team-based specialist groups (IT, Accounts, Legal) who interact with one another and who act independently of "top-level" approval may be an inherent requirement of the success of the incoming MIS.

Despite the theoretical depiction of Thermo-X as a hierarchy, the organisational structure resembles a web. The MD has overall control and is surrounded by other members of the organisation who support him fulfilling his, and the company's, corporate ambitions.

Authors agree [Schultheis & Sumner, 1995; Gibson, 1994; Licker, 1997; Handy, 1985] that hierarchical organisations have poor lines of communication and the weak delineation and dissemination of information contributes to the resistance exhibited by staff and internal structures. These same lines of communication are then used by Senior Management to convey corporate aims and ambitions to staff lower down on the hierarchical framework.

5.7.4 The Road to Acceptance

Once cultural and structural change methods have been successfully deployed within the organisation, the change process attempts to progress to the acceptance stage. This stage should not be viewed as a *fait accompli*. Before expanding further, I will state my views on the perceived significance of the change process' outward-bound arrow.

It is my contention that this arrow possesses "elastic" properties, ie. it is resilient and will resist attempts to stretch beyond its means. In simpler terms, although the arrow may have penetrated the "abstract" cultural barrier (and in doing so, re-entered the "real" world), this does not necessarily mean that instigated changes have been established.

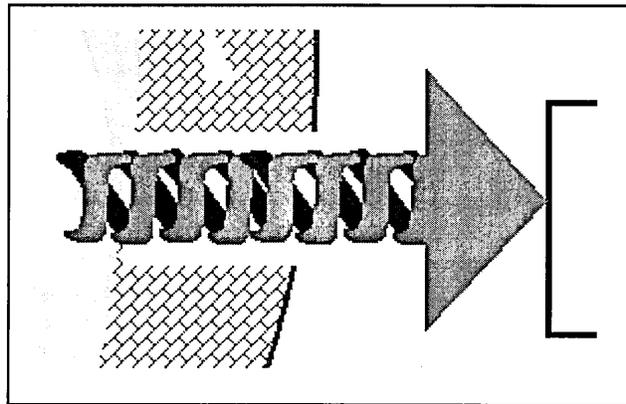


Figure 5.11: The Elastic Arrow

The acceptance stage can therefore be regarded as a "buffer-zone". This buffer-zone emulates a sounding-board against which new practices, hopefully instigated within the cultural barrier, are tested. Any resistance encountered at this stage is indicative of an ineffective change program, highlighting deficiencies within the cultural confines of the organisation.

However if a new culture, which will be receptive to a Management Information System, is the desired outcome, then I would suggest that, if this stage confirms inadequacies of the change programme, then these should be regarded with a positive attitude. The opportunity is there to resolve these issues before they can be exacerbated.

5.7.5 Stability

Having successfully reached the Acceptance stage, re-entering the cultural barrier if necessary to resolve any difficulties, the MISCO framework takes an evolutionary route to the Stability stage. The route to this stage should be supported by continued mentoring and facilitation, elements already displayed and conveyed by the change manager.

Although nearing the final stages, the transition between the Acceptance and Stability stages should not be executed complacently. Only when full Stability has been achieved should the change-manager be sure that his work is complete.

It should be stressed that, having achieved the objective of attaining a new culture, (a culture which has successfully accommodated a Management Information System and which has made appropriate changes to organisational structure), we may, given time and experience, return to our original starting position. This position was one where the management of the firm have recognised that a culture-change may be necessary.

5.8 Conclusion

Regarding the issues discussed in this Chapter, I would add my premise that a modern, UK-based SME is an organisation which is constantly evolving and which is willing to re-invent itself time and time again in the light of new, dynamic, pressures (both internal and external). In summary, the various change techniques involved can be portrayed diagrammatically [Figure 5.12].

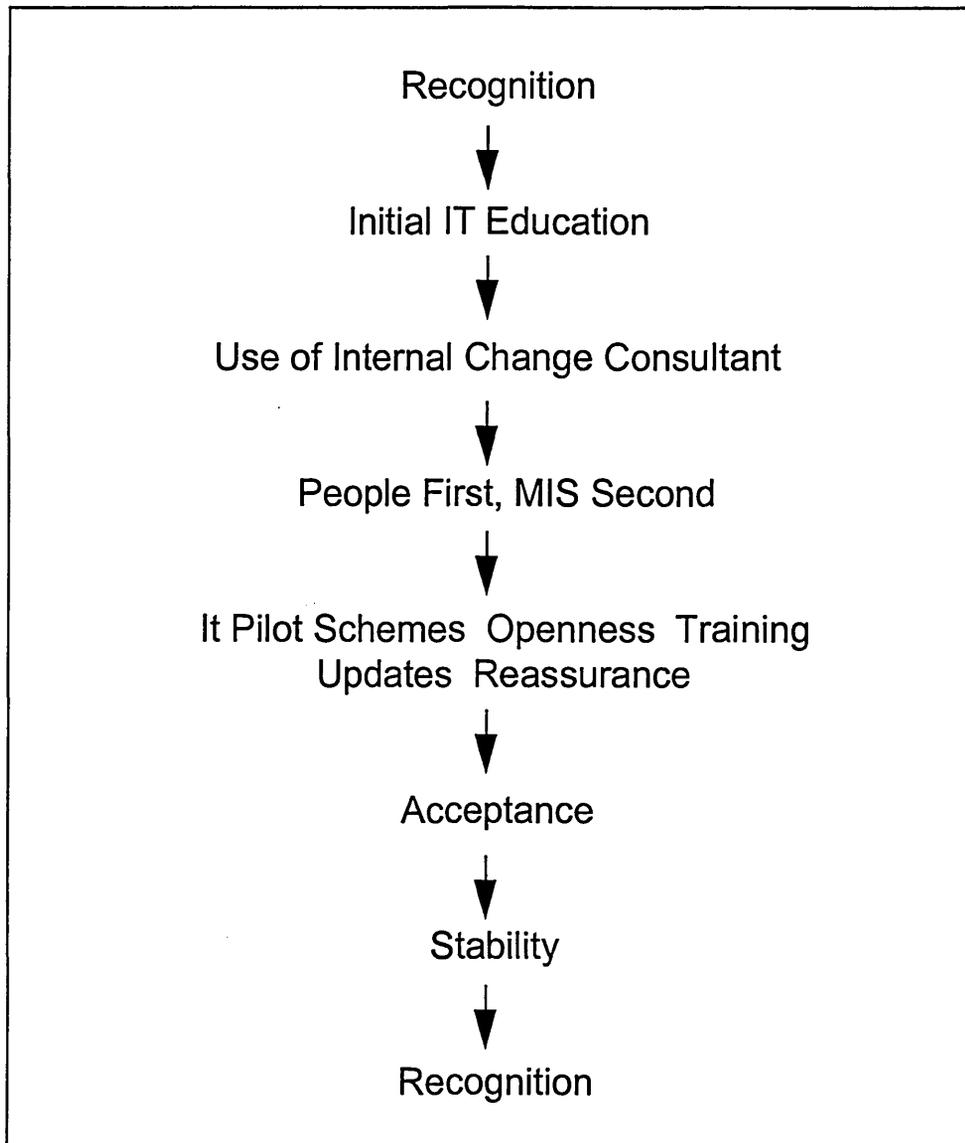


Figure 5.12: Stages to Success

Furthermore, it is my contention that the key to overcoming human resistance is the ability to be both open and honest whilst still respecting the established notional boundaries of employees. However, it should be remembered that these boundaries are not intractable and can be successfully permeated using the techniques already discussed.

The MISCO Conceptual Model was formed by observations at Thermo-X, coupled with findings from existing research. Empirical support, which will be carried out in the next chapter, is now required in order to strengthen the concepts put forward in this Chapter.

6.0 Case Studies: Validating the MISCO Model

6.1 Introduction

The nature of the investigation, and the inherent characteristics involved, called for exploratory and explanatory proof to support the ethnographic data from Thermo-X. This chapter details several case studies which, as outlined in Chapter 5, will test the theoretical MISCO Model conceptualised in the previous chapter.

The MISCO Model can then be used to assist non-technical persons to appreciate the cultural, organisational and technical consequences of implementing Management Information Systems into Small to Medium sized Enterprises.

6.2 Testing the Wider Applicability of the Model

Before fully accepting the merits of the theoretical MISCO Model put forward in Chapter 5, it will be necessary to validate and verify the conceptualised constructs. Vindication or contradiction in this manner supports Denzin's [1984] thoughts on triangulation, particularly regarding Methodological Triangulation, where the ethnographically-informed data can be supported by other data collection techniques. Only by repeating theoretical concepts and, if necessary, refuting the suggestions put forward, can the MISCO Model be truly acceptable.

6.2.1 Fact-finding

Fact-finding from these selected organisations was by way of a combination of some or all of the following techniques:

- short ethnographically-informed observations,
- site-visits,
- structured interviews with managers (IT, Senior and departmental),
- structured interviews with end-users of the MIS,
- structured interviews with practitioners or consultants.

Wherever possible, accompanying documentation (including such articles as initial proposals, progress schedules and handover reports) was obtained and analysed. During the structured interviews with the organisations, the MISCO Conceptual Model proposed in the last Chapter was shown to managers and workers at the organisations. Reactions and opinions were duly noted.

The results from these interviews were analysed in order to refine the original MISCO Model where necessary. Questions were ordered into one of eight sections: Overview, Organisation, Culture, Information Technology, Management Information System, The Implementation Process, Conceptual Model and Post-Implementation. The full MISCO framework for the structured interviews is provided in Appendix A.

6.2.2 Literature Search

Having confirmed that aspects of a UK SME's organisational culture can be altered, a literature search (involving the review and analysis of reports, industry reports, newsletters, an Internet search and researching Business Link and Training and Enterprise Council literature) was carried out in order to identify suitable organisations (the criteria for which is given in Section 6.2.3) in which the theoretical concepts could be tested. Several firms were highlighted and subsequently visited. The rationale and justification for selecting these firms will now be given.

6.2.3 Organisation Selection: Rationale and Justification

The rationale and justification for selecting suitable firms was of vital importance in correctly validating and verifying the MISCO Model. Organisations meeting the following criteria were targeted:

- the organisation should be a UK SME (employing less than 250 people) operating in a manufacturing or distribution industry
- the organisation should have recently implemented a computer-based information system
- the organisation should ideally demonstrate clear examples of either good or bad practice (including such practices as employee empowerment, autonomy, teamwork and Quality procedures).

It was important to ensure that these criteria were not too constrictive, as this may have simply identified those firms displaying homogenous characteristics. Such an approach would not have effectively tested the MISCO Model.

Instead I would argue that the characteristics highlighted in this section were used to identify coterminous organisations. It is further recognised that these organisations, although meeting the criterion of having implemented a computer-based information system, may possess phenomenologically-different cultural attitudes. This may have repercussions on the success of their MIS implementations.

6.3 Structure of the Case Study Investigations

Each of the following case studies takes a sectional approach. Each case will begin with a description of the company, motivation for its formation, establishment date, number of employees, turnover per annum, products manufactured and markets serviced.

This is followed by an analysis of the organisational structure, cultural attitudes in place and the operational procedures effected within the cultural and structural confines. The emphasis will then move to the implementation of the Management Information System in the organisation.

Following the constructs of the structured interviews (Overview, Organisation, Culture, Information Technology, Management Information System, The Implementation Process, Conceptual Model and Post-Implementation), the focus will turn to discussing the objectives of the MIS. This is followed by details of the implementation process, breaking down into pre-implementation planning, control, the implementation process itself and post-implementation processes. By presenting the above material, an understanding of the firms' cultural and organisational precepts, corporate aims and ambitions is established.

The fundamental precepts and constructs of the MISCO Model were explained. The MISCO Model was "walked through" and its suitability and applicability to the organisation discussed. Validation regarding the MISCO Model revolved around the following key questions:

- (1) Is the MISCO Model concise, comprehensive and understandable?
- (2) Do you agree with the constructs proposed?
- (3) Would the MISCO Model have been of any use to your organisation?
- (4) If the MISCO Model was expanded and was accompanied by a full set of supporting documentation, could you have used it as your MIS implementation plan?
- (5) As a result of your experiences, are there any amendments you would make to the Model?

6.4 Case Studies

This section will detail the outcomes of visits to several organisations. Each case-study lists the historical background of the firm, the organisational structure and culture in force and the effects of implementing a Management Information System into the organisational setting. The organisations studied are referred to as Company A, B, C and D respectively. Each case study is accompanied by comments received from organisational members. Section 6.5 will discuss these comments in greater detail.

6.4.1 Case Study: Company A

Company A Limited was established in Sheffield in 1841 as an engineering and manufacturing company. The company operates from a site in Sheffield, employing approximately 50 people. Turnover is approaching £2.25 million per annum.

Over the years, the company has designed and manufactured a comprehensive range of fluid transfer equipment, meeting customers' changing requirements on a world-wide basis. Presently, the company uses its wealth of expertise to develop and supply a wide range of fluid handling and transfer equipment, including many styles of hand and air operated transfer pumps.

The Company A product range includes steel fabrications for both waste oil collection and dispensing. These fabrications are epoxy-powder painted to suit customers' own colour requirements. Company A also manufactures a wide range of industrial band hose clips and also offer a full range of heavy duty open and closed hose reels. The company also designs and manufactures adapters to suit new closures available for large quantity orders.

Company A's products are used in diverse applications and industries, ranging from petrochemical, automotive and general fluid transfer situations. Company A also supplies the major oil companies and distributors with products around the world. Customers often require a short lead time (from manufacture to delivery), ex-stock delivery or may opt for a call-off (contract) order.

The interviewee for the Case Study was the Systems Manager who described the culture at Company A as the "original Old School, a very blue-collar, white-collar split" and "very autocratic".

The Systems Manager aimed to bridge the gap between "Them and Us" by liaising on a personal level with colleagues on the shopfloor. Previous implementation problems had occurred, making liaisons with workers a difficult step. Acceptability of the impending IT-driven change therefore met with some resistance from the shopfloor.

Organisationally speaking, horizontal communication is good with major decisions left in the hands of two people, the Chairman and the Finance Director. Figure 6.1 shows the organisational structure of Company A. The Systems Manager confirmed that the MIS implementation has changed the culture in force, albeit slowly, for the better.

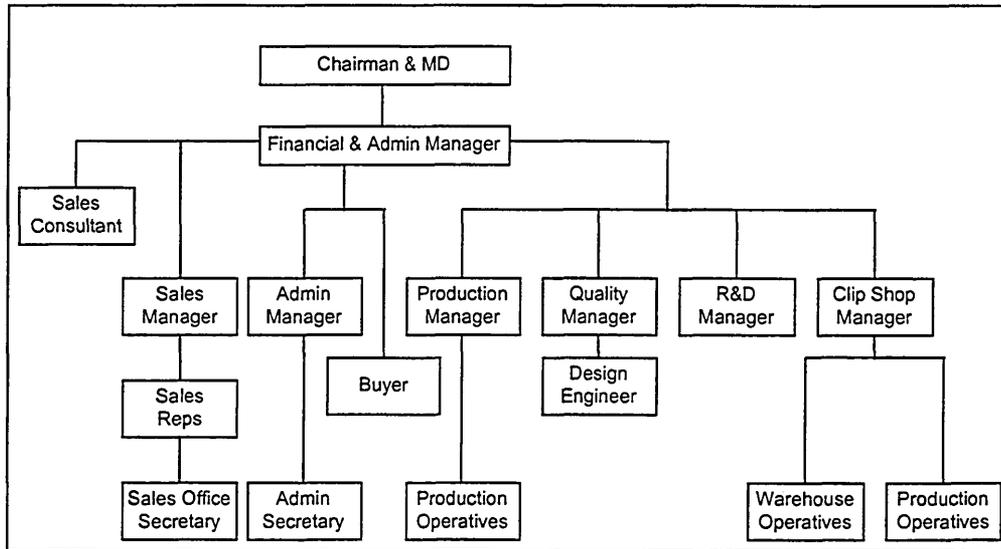


Figure 6.1: Company A Organisation Structure

Prior to the appointment of the Systems Manager, the IT needs were managed by the Office Administrator. In the last decade, a UNIX-based legacy system, running a 15-year old TETRA software package, had been transferred from a previous site. A Management Information System was purchased in 1993 but was not effectively implemented. As a result, a link had been established for Sales Order Processing and Purchase Order Processing with no real link to Stock Management. Financial figures were therefore grossly inaccurate.

The net result of these inefficiencies meant that the firm required extra functionality. Additional factors such as Year 2000 non-compliance forced the firm implement a new MIS. The Systems Manager was appointed due to his technical and academic credentials and experience of Integrated Manufacturing Systems. In September 1997, the first phase of a new MRPII manufacturing software package, Impact Encore, was procured and installed on a Microsoft NT platform.

The objectives to Company A of implementing the MIS system were to:

- reduce stock
- increase turnover
- increase the flow of pertinent information
- increase visibility and traceability of Work In Progress
- increase reporting tools
- increase operational efficiency
- increase levels of communication with customers and suppliers
- increase internal organisational efficiency
- have a centralised database
- increase production planning and control

According to the Systems Manager, in the main these objectives have been met. Physical stock levels have not actually gone down but the new system has identified parts which are MRPII-specific. Exports have been affected by the state of the strong pound.

Throughout the project period, top-line management have primarily exercised a "hands-off" approach to the MIS implementation. The experience of the Production Manager and input from the Finance Director has facilitated the implementation process. Top-line management have no real knowledge of Information Technology.

Additional technologies, besides from the procurement of Microsoft NT network software, Windows '95, new faster PCs and Impact Encore MRPII software have included the rollout of the Microsoft Office software suite. The approximate cost of this new system is £160,000.

The implementation process was started with presentations to key organisational members regarding the aims, objectives and benefits of the new system. The Systems Manager confirmed that his at the firm was initially met with suspicion from some members of the firm.

Apart from this, there was no real resistance as the old system was "dying" (literally, as some weeks prior to installation of the new Impact system, the hard drive on the UNIX server burst into flames). Constant reassurance countered any remaining scepticism as did the explanation that the current state of "fire-fighting" would be removed.

The culture has therefore changed to a state of more effective communication. Organisational changes have included the redeployment of the old Works Manager and a Storeman. These organisational members strongly resisted the incoming MIS and it was decided that they should be moved to areas where contact with the new system would be minimised.

Sales and Production personnel now work a lot more closely together as they are able to view outstanding orders and capacity on the MIS. This ensures that the sales department takes on orders after referral to production.

Several unanticipated benefits have come about from the implementation of the new System. Shopfloor data-collection, automated faxing and emailing from the network and the MS-Office software suite have greatly increased office efficiency. Detrimental, but short-lived, effects of the new system include the lengthy process of data input (customers, suppliers, products, component parts and Bill of Materials links).

MISCO COMMENTS

The depiction of the cultural and organisational constructs was well-liked but additional clarification of terminology was required. For example, I substituted the word "facilitation" with the term "helping or assisting" in order to assist understanding. The IT Manager asked what timescale would be involved for implementing the model; I argued that "time" would have been a very difficult concept to conceptualise.

Company A agreed that the model would have been of use to the organisation during implementation of their computer system. The conceptualisation of a change in organisational structure (from temple/web to matrix) was viewed with scepticism. The company thought that such a move, although desirable, would have been very difficult given the size of the organisation and the time-scale of their MIS implementation.

6.4.2 Case Study: Company B

Company B plc was incorporated in 1992 to take over the on-going business of Company B Limited which went into receivership earlier that year. The prime cause of the receivership was the demise of the Crown Suppliers company as the principal public sector and Government purchasing agency for office and contract furniture. At that time, this accounted for over 50% of Company B's business.

Company B's history goes back to 1942 and the company is now established as a major supplier, principally to the public sector, of educational, office and other contract furniture. Additional customers have requirements for stadium seating. Amongst the most important customers are the members of the Counties Furniture Group, the largest local authority purchasing consortium for educational furniture. Figure 6.2 depicts the organisational structure of Company B.

Company B operates from a substantial freehold site on the edge of Barnsley, occupying a modern 80,000 square foot factory on a site of approximately 2.5 acres. Current turnover is running at approximately £4 million per annum, substantially reduced from a peak in 1990. The company employs about 100 people but, because of seasonal demand (due to educational purchasing policies), this can rise to over 120.

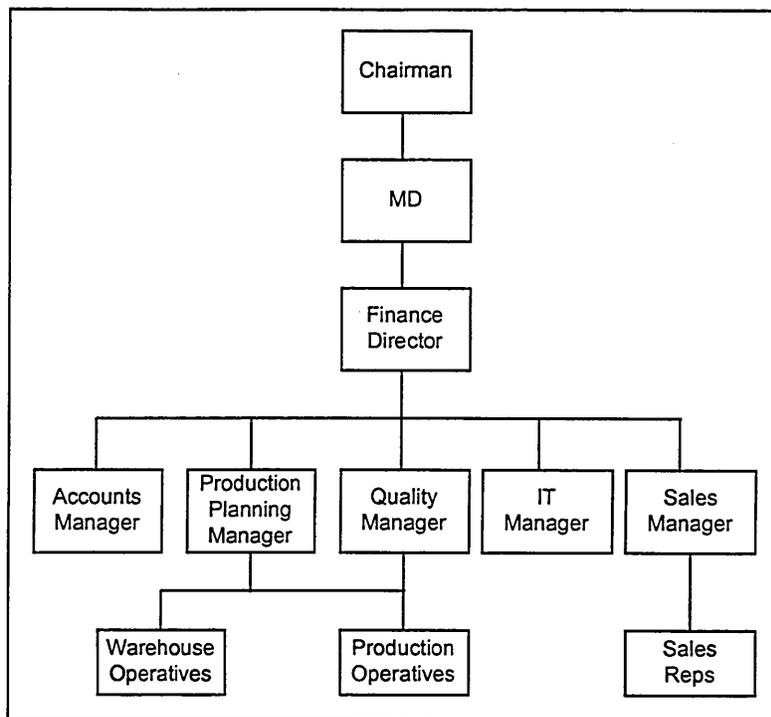


Figure 6.2: Company B Organisational Structure

The company operates a policy of core manufacturing independence and, accordingly has extensive in-house skills in metalworking, woodworking, upholstery and engineering development. Specialised equipment includes extensive powder coating facilities and modern CNC-controlled metal-forming and woodworking equipment.

The two interviewees for the Case Study were the Production Planning Manager and the IT Manager. Typical of many SMEs, the firm has undergone several organisational changes, the most recent of which has been the recruitment of a new Managing Director in January 1998. The previous MD was also the company Chairman, a position which he retains.

According to the interviewees, the new MD is IT-literate and is a firm advocate of new technology in the manufacturing environment. No other members of the organisation (other than the IT and Production Planning Managers) have a good understanding of Information Technology.

Although Company B employs an IT Manager, major decisions regarding IT strategy and purchasing policies rest with the Finance Director. Past IT projects have included the installation of a CAD system in 1995, a Payroll system in 1993 and the design and programming of several in-house databases over the last few years.

The success and merit of these projects has been mixed. Whilst the CAD and Payroll software systems are described as successful, some of the in-house packages have been more successful than others.

However, the overall success of these projects convinced the firm to take a more radical approach. The Production Planning Manager had been employed through a Teaching Company Scheme ('TCS') in conjunction with Leeds Metropolitan University. The remit of the programme was to improve manufacturing performance by streamlining existing operational techniques and to investigate the possibility of implementing MRPII systems and procedures.

Before the commencement of the Scheme, the company had been using MICROSS software on an old Novell network platform. As a result of the TCS programme, over £20,000 has been invested in the IT function. Additional computers have been purchased, older computers have been upgraded, external training organised and the latest version of Novell network software installed.

Features of MICROSS which either had not been used, or which had not been used effectively, were gradually introduced. The reasoning behind this was to demonstrate both functionality and usefulness to the company before making final decision regarding full system implementation. The objectives to Company B of implementing the MIS system were to:

- improve production planning
- have quicker turnaround of items (from order entry to despatch)
- have more accurate forecasting
- have quicker dissemination of works information to the shopfloor
- have clearer and more pertinent Management Information

According to the interviewees, 80% of these objectives have been met, with those remaining currently being investigated. Throughout the project period, top-line management have exercised a "hands-off" approach to the MIS implementation with the exception of progress reports. Cultural and organisational changes have occurred which have directly contributed to the success of the IT project.

Before the commencement of the IT project, the organisation was very much traditional manufacturing, performance-indexed with a hierarchical organisational structure. Great strides have been made in flattening the organisational structure. Employees have been encouraged to become more empowered with new tasks and responsibilities offered to suitable organisational members. Additionally, members have been encouraged to liaise with other departments in order to better understand their working practices and needs.

The Teaching Company Scheme, with contributions from experienced academics, and the appointment of the new MD have expedited the cultural and organisational changes. Reporting lines and lines of communication in general are improving constantly.

The MIS implementation process itself involved several pre-implementation presentations to management and line managers to inform them of the proposed changes and benefits of the new technology. The transition to Windows '95 and Windows '95-based software necessitated the arrangement of external training courses. The openness of this approach, together with the investment in experienced trainers, meant that there was limited resistance to the MIS implementation.

Organisational changes involved the analysis and subsequent streamlining of tasks and roles. Additionally, some changes were as a result of natural evolution. These changes, together with a subconscious culture-change have enabled the firm to introduce email (both internal and external), a benefit which would not have been possible before the commencement of the IT project.

Looking back at the implementation of the new technology, major additional benefits and services, which the firm did not anticipate, occurred. The new Windows '95-driven office software has greatly improved the presentation of company documentation, including sales quotes and administrative correspondence.

Future IT plans include upgrading the MICROSS system to have simpler logging-in procedures and to be fully Windows-driven, thereby making it more user-friendly and efficient. Changes to the sales function, which will enable the sales department to interact more with the computerised system, are anticipated shortly.

MISCO COMMENTS

The clarity of the MISCO schematic was liked by both the IT and Production Planning Manager. The interviewees agreed with the importance of Recognition in the framework. The Production Planning Manager had already recognised that the culture of the organisation would have to change in order to make the best of the new system.

A comment was made regarding the validity of the elastic arrow. The company argued that only a limited amount of visits should be permitted back into the cultural and structure context as, at some point, a commitment must be made so that progress can be made on the implementation process.

The company questioned the need to change from a temple/web organisational structure to a matrix structure. The organisation, like Company A, thought that such a move, although desirable, would have been very difficult given the size of the organisation and the time-scale of their MIS implementation.

6.4.3 Case Study: Company C

Company C is a leading privately-owned manufacturer of single use, plastic-based disposable healthcare products. Company C Healthcare is a registered trademark of Company C Limited, originally founded in 1953. The current Managing Director of Company C is the daughter of the original founder. Her brother is the current Technical Director.

Company C's products are used for patient care throughout the UK and are exported to over 70 countries worldwide. The products are all designed and manufactured in modern, purpose-built, facilities in Derby. The facilities include several clean rooms which have been developed in close co-operation with the Department of Health. Figure 6.3 depicts Company C's organisational structure.

Employing 200 people, the company's annual turnover is currently around £10 million, approximately £2 million of which is generated by the Customised Procedure Packs ('CPP') section of the company. CPPs are pre-packed kits consisting of necessary equipment and peripherals (such as clamps and sutures) for a wide range of operations.

The products manufactured and supplied include catheters, infant feeding tubes, oxygen therapy products, suction-connecting tubes and all link tubing. Purest grades of PVC are used and all flexible products which contact body tissues are manufactured from medical grade compounds which have no toxicological properties and which have a proven record of biocompatibility.

To reduce the risk of contamination, all manufacturing processes, including extrusion and injection moulding, take place in environmentally controlled areas. The company operates three clean rooms to BS5295 Class K standard. Contamination from people is physically controlled by the use of effective hygiene practices and by educating and training staff in the fundamentals of microbiology. Together with regular monitoring, feedback and preventative measures, these controls allow the company to deliver products with the minimum of bioburden. The majority of products have a shelf life of five years.

All sterilisation processes are fully validated and re-validated annually to ensure the required sterility assurance level. Sterile products are presented in packaging which cannot be re-used. The packaging has the necessary seal strength to maintain seal integrity during sterilisation, transport and storage.

Investment in human resources, training and technology has enabled the organisation to offer an increasingly wide range of user-friendly, high-specification products. A £1.5 million programme has seen the construction of a new, expanded manufacturing and storage complex.

The company manufactures over 30 million sterile products per annum, each meeting stringent international standards. Company C is registered with the Department of Health and has American FDA (Food and Drug Administration) Approval. Additionally, the company has ISO9002 Quality System accreditation and complies with the European Medical Devices Directive Essential Requirement. All appropriate products bear the CE Mark.

The company's state-of-the-art technology, combined with its experience, provides high capacity and fully automated flexible assembly lines. Modern PLC control systems reduce change-over times enabling efficient production of smaller batches with lower lead times. A network of CAD workstations is linked to a high-technology machining centre to achieve fast, cost-effective machine build.

The majority of customer orders are ex-stock with approximately 10% being bespoke orders. Historically, the firm has tendered to manufacture such items on a contract basis and has subsequently manufactures these items on an ex-stock (but with limited amounts of stock) basis.

In 1997, a new purpose built storage facility was opened to further improve the efficient picking, packing and despatch of goods via a computerised stock location and rotation system. The purpose-built warehouse and loading area accommodates over 1000 pallets allowing the easy retrieval of sterile goods via the computer system.

Company C has established a core network of overseas distribution outlets in all major European countries and numerous locations across the world. Literature and labelling is prepared in other languages where appropriate efforts are made to understand not just the needs of domestic hospitals but also the different working practices of customers worldwide. Collectively, the Export department speaks English, French and Spanish to offer the best service possible to their distributors.

The organisation's history has dictated the current organisational culture. The family influence means that the culture is fairly autocratic with some decisions dependent on final approval from the MD.

Historically, as the firm has grown, the IT infra-structure has struggled to expand at the same rate. The Accounts and Sales departments are linked using Sage Sterling ('Sage'). Purchasing and Stores are linked on a separate Sage system.

The company recognised that a major new investment was necessary in order to meet corporate aims and objectives. The solution came in the form of the Teaching Company Scheme ('TCS').

The interviewee for this Case Study was the IT Manager who had previously been employed at Company C through a Teaching Company Scheme in conjunction with the University of Derby. The remit of the Scheme was to improve manufacturing performance by streamlining existing operational techniques and to investigate the possibility of implementing MRPII systems and procedures.

Prior to the start of the TCS programme, no one person was in overall charge of the IT needs of the organisation. Approximately 20 personal computers were in place before commencement of the Scheme. At the time of writing, approximately 40 are in use with plans to expand this number.

Participation in the Teaching Company Scheme meant that Company C were able to use the technical expertise of the IT Manager who designed and wrote, with guidance and advice from academic specialists, a relational MIS database using Microsoft Access. This database was installed on a peer-to-peer network which spanned the, until then, disparate departments of Purchasing, Stores, Product Development and Manufacturing. The objectives to Company C of implementing the MIS system were to:

- remain competitive
- have enhanced reporting features
- have efficient stock-control

- reduce stocks (ideally)
- have clearer and more pertinent Management Information
- improve production planning
- improve quotation and actual lead-times
- reduce time-to-market

All of these objectives have been realised. Existing management, although having an appreciation of the benefits of IT, have left the "hands-on" aspect of implementation to the IT Manager and the academics. Progress reports and major decisions have been conveyed to top-line management.

The Sage MIS to date has cost in the region of £15,000. The production costs for the bespoke Access software program have not been costed as this has been produced in-house and as an integral part of the Teaching Company Scheme. An additional £35,000-£40,000 (hardware, third-party software and communication links between sites) is anticipated when a new, third-party, MIS is installed in 1999.

Company C, via advice from the University of Derby, recognised the need to implement the MIS correctly, appreciating that some organisational changes may be necessary. Top-line managers and line supervisors were involved in the pre-implementation stage of the project. Various short presentations and group discussions allowed participants (often the eventual end-users) to voice their concerns about the new technology. The IT Manager, again following advice from his academic supervisors, relayed the importance and relevance of the new system to concerned parties.

Resistance was encountered from some sections of the organisation when it was realised that some parallel processing of tasks would be necessary. Sales, Production and Purchasing personnel resented carrying out their essential daily tasks twice-over. Additionally existing staff, who had never used IT before, were required to use the new system. These staff were reluctant to do this. Many thought that they were being used to expedite implementation of the system which would then replace them on completion of their tasks.

The IT Manager empathised with their concerns. Difficulties in implementing parts of the MIS were countered by accommodating the needs and work patterns of part-time staff and the "technophobic" fear of IT training for some staff. Underlining the key merits of the new system was at the cornerstone of Company C's approach to systems implementation.

The IT Manager was flexible where necessary, the accommodation of unsocial hours of part-time workers serving as an example, showing both concern and understanding to those colleagues in fear of the impending system.

Organisational changes included the re-structuring of the Purchasing department by redeploying one member as a Personal Assistant. Responsibility for stock control has been passed to the Stores department, rather than the Purchasing department as was previously the case.

Cultural changes were also necessary. The IT Manager stated that opening people's minds to the advantages of the new system and to sell the idea of "wheels within wheels" was paramount to the overall success of the implementation. Ensuring that all staff were "singing from the same hymn sheet" mirrored the integrated objectives of the Management Information System. On an incidental note, the average age of the personnel at Company C is 28-30. This may have ramifications on a cultural and organisational level which will be discussed later.

Company C's future IT plans include the implementation of a new, cross-site, Management Information System, spanning all organisational functions. The company is investigating ambitious, yet realistic, plans to introduce touch-sensitive screens on which graphical images of components and assemblies can be displayed in order to help production staff.

The company has experienced additional benefits which were not originally anticipated. People's acceptance of Information Technology is now much stronger which will stand the company in good stead for future IT implementations. This new commitment to technology has been disseminated throughout the organisation and staff are now aware that the technology benefits them.

During conversations with several end-users, I can confirm that staff have taken to the new MIS technology and to IT in general. I can further report that staff have been so struck by the benefits of IT that new requirements, such as faster machines, bigger screens, increased functionality, have been demanded. The IT Manager jokingly referred to this as the "spoilt-child syndrome".

MISCO COMMENTS

The depiction of the organisational and cultural constructs met with approval as the distinction facilitated understanding of the change process. The elastic arrow was well received but the relative importance of the matrix structure was not thought to be applicable to Company C. The company appreciated that the culture of the organisation may have to change in order to ensure successful implementation of the new information system.

The depiction of the cultural and organisational constructs was well-liked but additional clarification of such terminology as "mentoring" and "dissemination" was required. The company agreed that the model would have been of use to the organisation during implementation of their computer system.

6.4.4 Case Study: Company D

Company D plc was formed in the late 1970s and trades as importers, wholesalers and distributors of handicrafts, fashion goods, clothing, tea, coffee and wholefoods from developing countries. The Company also sells greeting cards and recycled paper. The Company has a turnover of approximately £5 million per annum and employs 80 people at a distribution centre in Tyne and Wear.

About 80% of the Company's turnover is credit-order to volunteer "Fair-Traders" who currently number 3000. These Traders do not get paid, but receive commission on sales and enjoy the benefits of 30-days credit on all purchased items. The organisational structure of the company is depicted in Figure 6.4.

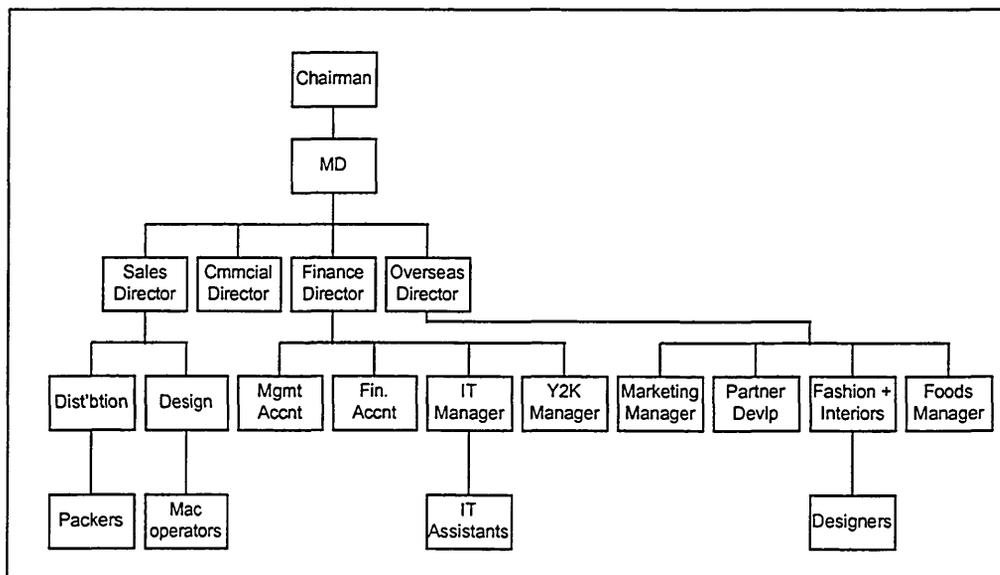


Figure 6.4: Company's D Organisational Structure

During 1997, the Company ceased retailing activities through its wholly owned subsidiary company, Company D Alternatives Limited. Within the constraints of sound financial management, the Company aims to maximise the benefit to the overseas producers from whom the Company buys its handicrafts, fashion, foodstuffs and other products.

The interviewees for the case study were the Y2K Manager and the IT Manager, both of whom confirmed the Company's basis in a christian ethos of fair trading. The interviewees further confirmed that, even after trading for 20 years, the company's reason for existence (the christian ethos) is still present and valid.

The effectiveness and efficiency of the lines of communication varies enormously according to the effectiveness of the executives reported to. The organisational culture is described as being a good balance between autocracy and autonomy.

Both the IT Manager and the Y2K Manager operate with a fair degree of autonomy but major decisions are at the behest of the Finance Director. Prior to a recent IT overhaul, the organisation decided to undertake a revolutionary Business Process Re-Engineering ('BPR') exercise.

This exercise met with varying degrees of success. Changing certain beliefs proved to be difficult. In the words of the Y2K Manager, "sacred cows" (such as purchasing procedures and the views and opinions of the Finance Director) existed which precluded the success of true change.

Company D experienced several false starts due to internal power-struggles. Several members of staff left, including the Finance Director and the former IT Manager. After the departure of these people, progress on both the BPR and IT implementations increased.

The BPR exercise involved hiring external consultants and the selection process was a traumatic experience for Company D. Independent and multinational consultancy firms were invited to quote for the BPR overhaul. Quotes ranged from 2 afternoons to a full-year. As a result, confidence in any BPR or change-process was severely dented.

An independent consultancy advocated collaboration to bring about change. Working with Company D managers, line managers and "Key Personnel" were selected and trained for the impending procedural change. Some elements of the BPR activity were relatively easy and more successful than others.

By way of example, The IT Manager affirms that changing the attitudes of personnel, such as the Distribution Manager, was a difficult process. Such persons have often been with Company D since its inception and have grown comfortable with their familiar work patterns. Despite several laborious attempts to modify such behaviour, the only recourse was to redeploy or remove these persons. The net result of these changes was that the impetus and, in the words of the IT Manager, the "mentality for change" has altered.

Responsibility of the Management Information System implementation fell to the IT Manager and the Y2K Manager. Internal personnel changes meant changes to the IT Team. The Y2K Manager has been with Company D for several years and has worked in virtually every department of the organisation. Promotion to the IT Team was a shrewd move as her background to Company D's procedures and working practices, on a company-wide basis, could be matched with the technical skills possessed by the IT Manager.

Motivation for a new MIS revolved around Y2K compatibility. The old bespoke system was not compliant and was also becoming cumbersome in terms of maintenance. Additionally, as the company's aspirations grew, the supporting IT infrastructure did not grow at the same rate. It was anticipated that more efficient reports would be produced as well as allowing enhanced access to pertinent data and information. At the time of writing, these objectives were starting to transpire.

The phased implementation approach of the MIS contributed to the success of the system. Regarding the inclusion of top-line management in the implementation process, it is understood that management have had a greater opportunity to partake than has been taken up. Fortunately the departure of people, such as the former Finance Director and the "back-seat" approach taken by top-line remaining management, has actually assisted acceptance of the MIS.

On a technical note, Company D selected BPCS, a manufacturing software package, running on a UNIX platform. Spanning 3 servers, the MIS serves 50 users. One of the servers provides company-wide Internet and Email access and another houses the old financial-based software packages for historical reference only. The approximate cost of all software, hardware and network infrastructure was £250,000. The interviewees rate, on a scale of 1 to 5, (1 being bad, 5 being good), the success of the implementation as a 4.

Staff were prepared for the impending change in a number of ways, including dissemination of the "Statement of Requirements" to the setup of "key-users" (users who have worked at Company D for several years). The importance of these key-users was explained to line and department managers. Test-data was used to prototype and test the new system. Apart from the resistance already discussed, additional resistance did arise from top-line management who voiced concerns regarding time-scales for implementation

The interviewees described cultural and organisational issues as being of the "suck-it-and-see" variety. Certain line and department managers were apprehensive when it was explained that key-users in their group or department would be spending approximately 60% of their time implementing the new System. As an example of the behaviour exhibited by certain personnel, these line managers agreed to this time-period as long as the same key-users still carried out 100% of their old duties.

IT training was organised in conjunction with the local TEC and a local Technical College. Students and staff from the College were invited into Company D to assist in the acceptance of the new System. The link with the College enabled several Company D employees to gain a RSA qualification as well as instilling a sense of a "proper" and professional implementation programme.

MISCO COMMENTS

Management had already recognised that factors such as Y2K compatibility and the need to remain competitive would lead to an overhaul of the existing IT systems. This confirmed the importance of the Recognition stage in the MISCO model.

The interviewees felt that the desired change from a temple/web structure to a matrix organisational structure would require management to empower employees. The interviewees submitted such an empowerment would be significantly easier at the company given their experience with external BPR consultants.

The interviewees felt that the model could have been of use to the company during implementation. Management, trainers and employees could have used the model to facilitate understanding and to monitor and evaluate progress of cultural and organisational change.

6.5 MISCO Framework Validation

As discussed, the MISCO Model was "walked through" with key personnel at each of the firms in order to test its suitability to the organisation. Validation revolved around the following key questions:

- Is the MISCO Model concise, comprehensive and understandable?
- Do you agree with the constructs proposed?
- Would the MISCO Model have been of any use to this organisation?
- If the MISCO Model was expanded and was accompanied by a full set of supporting documentation, could you have used it as your MIS implementation plan?
- As a result of your experiences, are there any amendments you would make to the Model?

Personnel from all four organisations agreed that the MISCO Model was easy to follow, was understandable and was schematically presented in a compact, attractive and concise manner. Favourable comments were received from both Company B and Company C regarding the clarity of the diagram. The depiction of, and distinction between, the cultural and organisational contexts was highly regarded by Company A.

Participants from both Company A and Company C required additional clarification of the terminology used. Terms such as facilitation and dissemination were substituted with simpler words and terms, such as "helping and accelerating" and "broadcasting and sharing", to explain the point.

All four organisations agreed in principle with the stages of the MISCO Model as depicted. Company B and Company D had recognised that some form of recognition was necessary leading to a detailed plan to implement new systems and procedures. Recognition was normally influenced by the success of corporate plans of competitors. Organisational efficiencies by these organisations have often dictated the commencement of radical IT plans in the host organisations in order to remain competitive.

Cultural changes had been subconsciously recognised (once the implementation process had commenced) by Company B and Company A. The "six discs" of cultural change, as depicted in the original MISCO schematic, were initially met with apprehension from all of the organisations. The wording and context of some of the "discs" raised questions from many of the interviewees. However, the accompanying walk-through documentation explained in greater detail the importance and significance of the discs and overcame initial concerns.

Some concerns over the importance of the structure context were cited by some participants. Company C's main concerns lay with the applicability of the structure context and the changes therein and whether a matrix structure was strictly necessary for the MISCO Model to work. The elastic arrow was well received as it was recognised that minor re-adjustments had been necessary to gain full acceptance of their MIS.

Company A expressed concern that timescales had not been incorporated into the MISCO Model. It was explained that, as every IT implementation would be slightly different, this would have been a very difficult item to conceptualise. This was accepted but it was still thought that the MISCO Model could incorporate an element of "time-compression". Company A's experience with a faulty server system meant that certain elements of the change process had been hastily executed in order to expedite installation of the final system.

The overall conceptualisation of the MISCO framework and the stages of change involved was well liked by Company B. A comment was made regarding the elastic arrow as, in the participants' experience, only a limited amount of visits should be permitted back into the cultural and structure context. At some point, a commitment must be made so that progress can be made on the implementation process. This comment was welcomed.

All of the organisations agreed that the MISCO Model would have been use to them either before or during the implementation process. However, all organisations thought that, if it were not for external assistance (for example, the Teaching Company Scheme), the organisation would not be in a position to implement the MISCO Model themselves.

The main use of the MISCO Model would be to work in tandem with the assistance of existing academic guidance. The schematical nature of the MISCO Model (or parts of it) could be used to aid end-user understanding of the change-process.

All of the participants thought that accompanying documentation would aid organisational understanding of the MISCO Model's precepts and intentions.

Company D commented that the MISCO Model would work well with IT staff but senior management would still have the same problems accepting, and paying for, change. Company D also said that "empowerment" was important and valid if true responsibility was achieved. All too often, in their experience, empowerment was nothing more than management "washing their hands" of organisational accountability.

The organisational changes proposed (the move from a temple/web organisational structure to a team-based matrix structure) originally met with some scepticism from Company A, Company B and Company C. The relatively small size of these organisations was cited as barrier to achieving a shift to the matrix structure. However, it was admitted by all of the companies that some organisational changes (involving employee empowerment and a change to a matrix structure) had occurred, whether by means of enforced and voluntary redundancies, redeployment, redesignation, downsizing and a move to new geographical sites.

Company D thought that, in their experience, organisational change was not a contributing factor to success. However, it should be remembered that a major BPR, encompassing organisational and procedural change, had been carried out prior to implementation of the MIS. Company D counter this, explaining that communication was pitched on an organisational level, rather than on a technical bias. An attitude of the "same jobs, but better" prevailed.

After some discussion, it was agreed that concerns with the structural context was due to a lack of understanding of its role in the change process. It was understood that the structural context is a theoretical depiction of the ideal scenario, one in which all objectives are attainable and where ambiguity is minimised.

Although a "sea-change" approach - from temple or web structure to a matrix - was proposed and favoured by the organisations, it is recognised that reality will not always practice. All organisations experienced structural change which could be conceptualised by a progressive shift to the ideal matrix structure hypothesised. It could therefore be argued that a shift to the matrix structure is "in progress" during implementation of the MIS, one which has normally reached a conclusion on full implementation of the new system.

6.6 Discussion

The feedback from the participants was both constructive and useful. The purpose of these organisational experiences was to support or contradict the constructs put forward in the MISCO Conceptual Model. The comments received suggests that some conceptual re-evaluation is called for.

Although many of the constructs were agreeable to the visited organisations, the organisations raised some concerns regarding construct feasibility or applicability to the overall process. This re-appraisal can fine-tune the MISCO Model so that it can be useful and valid to other organisations.

Analysis of the interviews at the four SMEs revealed a commonality of interests and experience in a number of different areas, the most important of which will now be listed.

- All of the interviewed SMEs carried out an evolutionary IT route, expanding on legacy systems in order to further company ambitions.
- Prior to the implementation of the new MIS, no formalised or recognised IT Strategy or Plan (other than SSADM or SSM) had been used. Hence, duplication of several data processes and procedures was commonplace (for example, involving Accounts and Order Processing).
- Shifting to the new MIS has required the replacement of obsolete equipment and the subsequent procurement of new hardware, software and network infrastructure.
- Management involvement in the definition of new requirements, both on an historical basis and for the new MIS, has allowed experienced users to participate in the Requirements Definition phase of implementation.
- Reliance on legacy systems has often been indicative of the organisation's culture (a reluctance to replace ineffective and outdated information systems).
- Disparate development and installation of stand-alone software packages in some departments has not facilitated central co-ordination

of IT activities. This individual technical approach is mirrored by the existence of departmental "sub-cultures" in all of the visited SMEs (for example, people in a service department carrying out procedures in a vastly different manner to people in a manufacturing department).

- Provision of proper IT Training has often had minimal presence at the SMEs. Interviews have revealed that even the legacy system were not used to their full potential. Recognition of this, and emphasising its importance for the new MIS, is a key element of the MISCO framework.
- Transfer of data has often been on a non-standard basis with no reference to Best Practice or recognised IT procedures. A simple example would be data transfer by disk (a procedure coined "Diskernet") rather than via a secure network connection. The risks to data integrity, reliability and exposure to viruses is all too apparent.

6.7 Revisiting the MISCO Conceptual Model: Revisions and Modifications

Following the comments received from the visited organisations, the original MISCO Model has been revised to embody these views. The new figure, Figure 6.5, uses the original MISCO Model as a foundation but has been refined to show the importance of core competency and incorporates a more realistic depiction of organisational and structural change necessary for success.

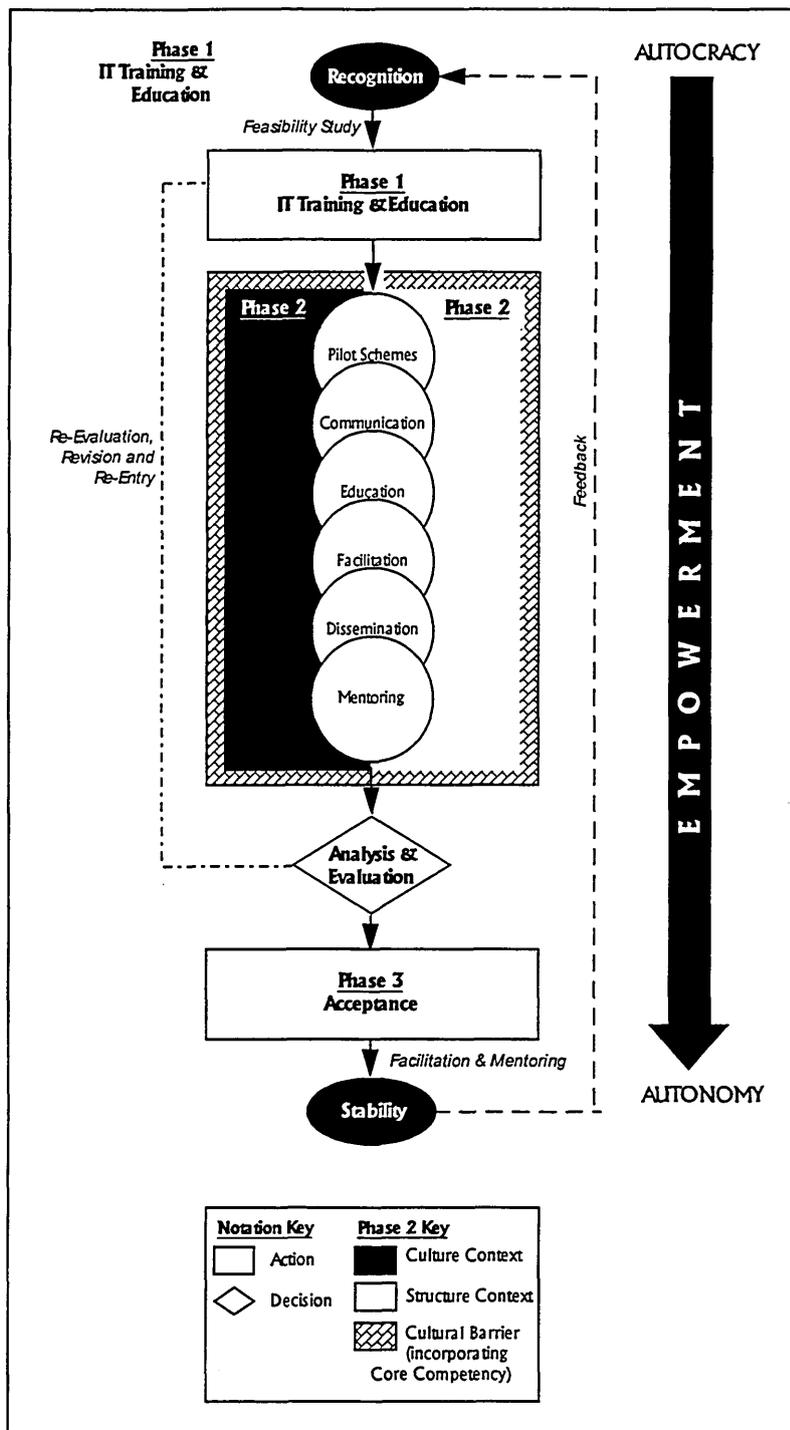


Figure 6.5: Revised MISCO Model

Modifications have been made to the "interior" contents of the cultural barrier.

Whilst the depiction and distinction between the cultural and structural/organisational contexts remain, the "six discs" of cultural change have shifted so that they straddle the dividing line between these two contexts. This change still reflects the fact that the change-factors (IT Pilot Schemes, Communication, Education, Facilitation, Mentoring and Dissemination) embrace and impact on both cultural and structural change.

The previous presence of the organisational shift (from Temple/Web paradigms to a Matrix structure) has been removed from the interior of the MISCO framework. This does not nullify its importance and significance as the structural-change process has been transplanted to the exterior of the cultural barrier. Following the comments from the external organisations, it is accepted that the original construct that organisational structure should be changed to a Matrix structure was perhaps too regimented.

The interviews with the external organisations suggest that such a move, although appealing, would have been impossible to achieve within the time periods of their MIS implementation. They agree that, although ideal progress would have involved a move to such a structure, a more realistic depiction would be to move from an autocratic arrangement to a more autonomous structure, without the formalised "labelling" confines of Temple, Web and Matrix.

The new "empowerment" arrow represents a shift from an Autocratic environment to a more Autonomous one. This echoes the sentiments put forward by all of the visited organisations. The importance of Core Competency is reflected in the new schematic by its inclusion as part of the Cultural Barrier.

Views from McAuley [1994] and Bate [1990] viewing culture as a control sub-system and a determinant that can be controlled (and managed by managers deemed to be competent) are now reflected in this new addition. As already discussed, competency (the aptitude and proficiency of organisational members) can be used to measure the acceptance or rejection of activities or behaviour of an organisational member.

Competence can therefore indicate the cultural bearing of the organisation. The importance of the link between organisational culture and core competency is brought sharply into focus by McAuley's [1994] comment that if certain *competent* organisational members and a core *cultural component* of are at odds, the same behaviour that was once considered "competent" can now be incompetent. As a result of this association, the inclusion of core competency has an important role to play in the new MISCO Model.

6.8 Conclusion

This chapter has added empirical support to the original MISCO Conceptual Model, formed by the ethnographically-informed data at Thermo-X and from the findings of established researchers. Exploratory and explanatory proof from four external organisations has supported and strengthened the ethnographic data from Thermo-X.

This chapter has detailed several case studies which have confirmed many of the constructs put forward in the original MISCO model. The experiences from these organisations suggested some conceptual re-evaluation of the original model and the framework has been revised. The next chapter documents the new, revised, MISCO framework in its entirety.

The discussions with the external firms, together with the original ethnographic findings, have revealed the following propositions which are used in the MISCO User Guide (provided in the Appendices).

- SMEs often need a MIS in order to remain competitive
- SME employees are often opposed to the implementation of a MIS
- SME employees are often unconvinced of the merits of a MIS
- SME often employ technophobic employees
- Management need to recognise the importance of the above issues
- SMEs can use IT Pilot Schemes, Communication, Dissemination, Training and Mentoring to bring down barriers in order to facilitate the culture-change and organisational-change process.

7.0 Conclusion

7.1 Introduction

This Chapter will look back on the various research processes involved during the project period. The main findings of the work will be presented in the form of a contribution. Implications and opportunities for further work will be provided.

7.2 Reflecting on the Research Aim

To recapitulate on the aims of the research, it was my contention that culture change is evident when implementing far-reaching Information Technology programmes. The anticipated benefits of IT implementations must be offset with the operational-procedure changes necessary to both initially receive and successfully accommodate the new technology.

Although a vast amount of literature exists concerning both organisational culture and Information Technology on an individual basis, research combining these two areas is, at best, rare and, at worst, inappropriate to a UK SME environment.

The objectives of the research were:

- (1) to establish the cultural and organisational aspects of implementing a Management Information System into a UK-based SME
- (2) to formulate an innovative implementation framework which such a firm could use to implement a MIS and
- (3) to analyse and consider the role and importance of management during the change process.

Following a literature review on organisational culture and Management Information Systems, these objectives were analysed and refined to form a central research question, focussing on the culture and organisation-change dynamics involved:

*Can MIS success be influenced and affected by
a change in organisational culture?*

7.3 MIS Implementations: The Complexity of Culture

The 1980s generated a wide variety of new managerial concepts, some of which were considered salient and valid by some practitioners and academics but, to others, was considered inefficient and irrelevant.

Rational analysis reveals that contemporary programmes have encompassed "buzz words" of which empowerment, communication, coaching, competency, performance measures and Business Process Re-Engineering are suitable examples.

IT projects have met with a mixed level of success in organisations. Rather than improving internal and external responsiveness, productivity and communication, the result is often a poorly-specified system. The periodical *Bulletpoint* [1997] ran an article supporting the view that organisational IT strategy is often misaligned with business strategems. Focus is often too technical or has been accompanied by a poor business understanding on the part of IT Managers. Problems can also be encountered when trying to quantify the benefits of system implementation.

Organisational and cultural changes can be a key inhibitor or facilitator to successful implementation. However, attempting to change an organisation's culture is far from easy. The change process is riddled with a variety of challenging barriers which must be overcome in order to change the culture. Recognising and acknowledging the existence and complexity of these difficulties is central to the change process as, without this recognition, cultural and structural change will meet with failure, as will the anticipated benefits of the IT implementation.

Organisational culture-change is far from easy and is not a mechanistic process. The simple change to or adaptation of one or two organisational processes will not make great inroads into the change-process. There are many ways in which culture can be changed and this research has documented one such approach.

There are many different methodologies and frameworks for changing culture. To date, none has attempted to apply the aspect of cultural change to implementing a Management Information System within a Small to Medium sized Enterprise environment. The proposed MISCO Conceptual Model rectifies this and puts forward an original culture-MIS framework.

The MISCO Conceptual Model uses ethnographically-informed data from a thirty-month IT project at a UK-based manufacturing SME. The original MISCO Model has been validated at several external organisations and has been refined as a result of comments and suggestions received.

It is reiterated that the MISCO Model is a framework which may not be suitable for all organisations. The MISCO Model has been designed for UK-based SMEs attempting to introduce a MIS into the organisation. The Model uses data from UK-based organisations and it may well be the case that the model is less successful in other countries whose cultural basis is different to that of in the UK.

Attempts to coerce other scenarios to fit the constructs proposed will invalidate the MISCO Model's usefulness. Evolutionary steps and progress will enable modifications and revisions to be made to the MISCO Model in order to maintain its validity and applicability to contemporary scenarios.

Verification and validation has been provided by testing the MISCO Model's hypothesis in several external firms. MISCO's original constructs were used to carry out cultural and organisational changes at Thermo-X. Comments and outcomes from the implementation approaches of these firms have refined the original MISCO Model to form a new MISCO Model for MIS implementation in UK-based SMEs.

The findings from Thermo-X and the external organisations has shown the importance of top-managerial support before, during and after the change process. The recognition that top-down support is necessary facilitates the MIS implementation. Managerial support in name only is wholly insufficient as the attitudes, beliefs and values of top-line management will be communicated throughout the firm. This dissemination can either hinder or expedite the implementation process.

7.4 Originality

The originality required for the submission of the PhD thesis was a pressing factor and I researched this area to ensure acceptance of the final script. In my experience, many lecturers have said, albeit in simple terms, that the award of a PhD is for a "contribution to knowledge", the term "originality" often incorporated into their definition.

There are several ways in which originality can be ensured and correct interpretation is essential in order to avoid ambiguity [Francis, 1976; Phillips, 1992]. Work by Francis [1976] in the areas of civil and mechanical engineering and student and examiner interviews by Phillips [1992] have yielded several definitions which are listed below (the first six from Francis [1976], the last nine from Phillips [1992]):

- (1) Setting down a major piece of new information in writing for the first time
- (2) Continuing a previously original piece of work
- (3) Carrying out original work designed by the supervisor
- (4) Providing a single original technique, observation, or result in an otherwise unoriginal but competent piece of research

- (5) Having many original ideas, methods and interpretations all performed by others under the direction of the postgraduate
- (6) Showing originality in testing somebody else's idea
- (7) Carrying out empirical work that hasn't been done before
- (8) Making a synthesis that hasn't been made before
- (9) Using already known material but with a new interpretation
- (10) Trying out something in this country that has previously only been done in other countries
- (11) Taking a particular technique and applying it in a new area
- (12) Bringing new evidence to bear on an old issue
- (13) Being cross-disciplinary and using different methodologies
- (14) Looking at areas that people in the discipline haven't looked at before
- (15) Adding to knowledge in a way that hasn't previously been done before

In this thesis, originality has been met in three of the above areas (points 7, 8 and 13: (7) Carrying out empirical work that hasn't been done before, (8) Making a synthesis that hasn't been made before and (13) Being cross-disciplinary and using different methodologies. Justification for these three areas are discussed in the next section.

7.5 Contribution

The nature of the research dictates a synthesis of many different areas and topics which have not previously been linked. The findings from the research are consequently cognate and a contribution to existing knowledge is made in a number of different areas.

- (i) A Conceptual Model for Successful MIS Implementation in SMEs is offered to assist such organisations in their efforts to implement new technology into the workplace. It is emphasised again that the MISCO Model put forward is one such approach. The intricacy and difficulty of defining and changing organisational culture is such that modifications and revisions may be required for some organisations.
- (ii) The findings are given credibility as the research has been carried out in a "live" environment. The MISCO Model has been tested and validated in several external organisations.

- (iii) The focus on Small to Medium sized Enterprises enables this sector of the business community, which often has no financial fallback in case of an inefficient and ineffective implementation, to implement a more effective IT solution.

- (iv) The research makes a contribution in the area of research methodology. It has been shown that the novel combination of different research paradigms (the cross-disciplinary approach discussed in Chapter 2) can present notable data and information to the researcher.

7.6 Impact of the Research Experience and the MISCO Model

The research process, and the subsequent formation of the MISCO Model, has implications and has had an impact at several levels: Thermo-X, the UK SME sector, the researcher and to established culture-change models. The impact on these levels will now be discussed.

IMPACT ON THERMO-X

- Thermo-X were able to use the MISCO Model to evaluate themselves during and after the change-process
- Thermo-X can use the MISCO Model to implement a Management Information System in the future

IMPACT ON THE UK SME SECTOR

- Existing methodologies do not apply the aspect of cultural change when implementing a MIS into a UK-based SME
- The MISCO Model puts forward an original culture-MIS framework which can be used in the UK SME sector
- Evolutionary steps and progress allows modifications and revisions to be made in order to maintain the MISCO Model's validity and applicability to contemporary scenarios
- The framework emphasises the importance of top-managerial support before, during and after the change process
- The Model recognises that top-down support is necessary in order to facilitate the implementation of a MIS
- The MISCO Model may well be less successful in other countries whose cultural basis is different to that of in the UK

IMPACT ON THE RESEARCHER

The research experience has enabled me to:

- appreciate the efficacy of the ethnographic process
- appreciate the complexity of organisational culture
- experience the difficulties involved when attempting to change an established culture
- combine different research paradigms in order to provide notable data and information to the researcher

IMPACT ON CULTURE-CHANGE MODELS

- The MISCO Model can be used as an implementation framework in the same way that more established culture-change Models are used
- The table formed earlier in the thesis can now be revised with the addition of a column comparing the MISCO precepts with the established frameworks:

FACTOR	LEWIN	SCHEIN	LUNDBERG	DYER	GAGLIARDI	BALI (MISCO)
Crises	Felt need for change	Leadership succession	Precipitating Pressures (Triggering Event)	Triggering Event	Experience of difficulties	Precipitating Pressures (Triggering Event)
Leadership	Conflict resolution	Leadership central to stages	Stable leadership team	Leader or team vital	Change of leadership	Leadership central to stages
Success	Establishing culture is Implicit	Establishing culture is Explicit	Establishing culture is Implicit	Establishing culture is Explicit	Establishing culture is Explicit	Establishing culture is implicit
Learning	Learning Process	Learning Process	Learning Cycle	Learning Cycle	Learn from Success	Learning/ Mentoring Cycle

7.7 Areas for Further Research

- (i) Suggestions for further work revolve around expanding on the ideological concepts already presented. Triangulation techniques can be continued and expanded with quantitative data techniques - perhaps taking the form of detailed questionnaires to a wider audience - can be used to further validate the research findings.

- (ii) The focus of my research has been on UK-based SMEs operating in a manufacturing environment. Opportunities may exist to expand on this by applying and refining the MISCO Model in other industries, such as service and retail, in order to form either a generic framework or specific model for these industries. Law firms in the UK may also benefit from using the MISCO Model. The structure of these firms has often meant that organisational responsibility for IT needs rests with a managing or senior partner.

- (iii) The complexity of culture has been fully discussed within this thesis. The applicability and validity of cultural identity and semantics results in varying definitions of culture. I would suggest that applying the MISCO Model to companies outside the UK (perhaps in Europe and the United States) would require a major re-evaluation of the conceptual constructs. Immersion in and experience from these different cultures may well result in a different MISCO Model.

It is now up to academics and IT practitioners to use the proposed MISCO Model, either in its existing form or after modification, in order to exploit its usefulness to UK-based SMEs.

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Appendix A

Appendix A: Framework

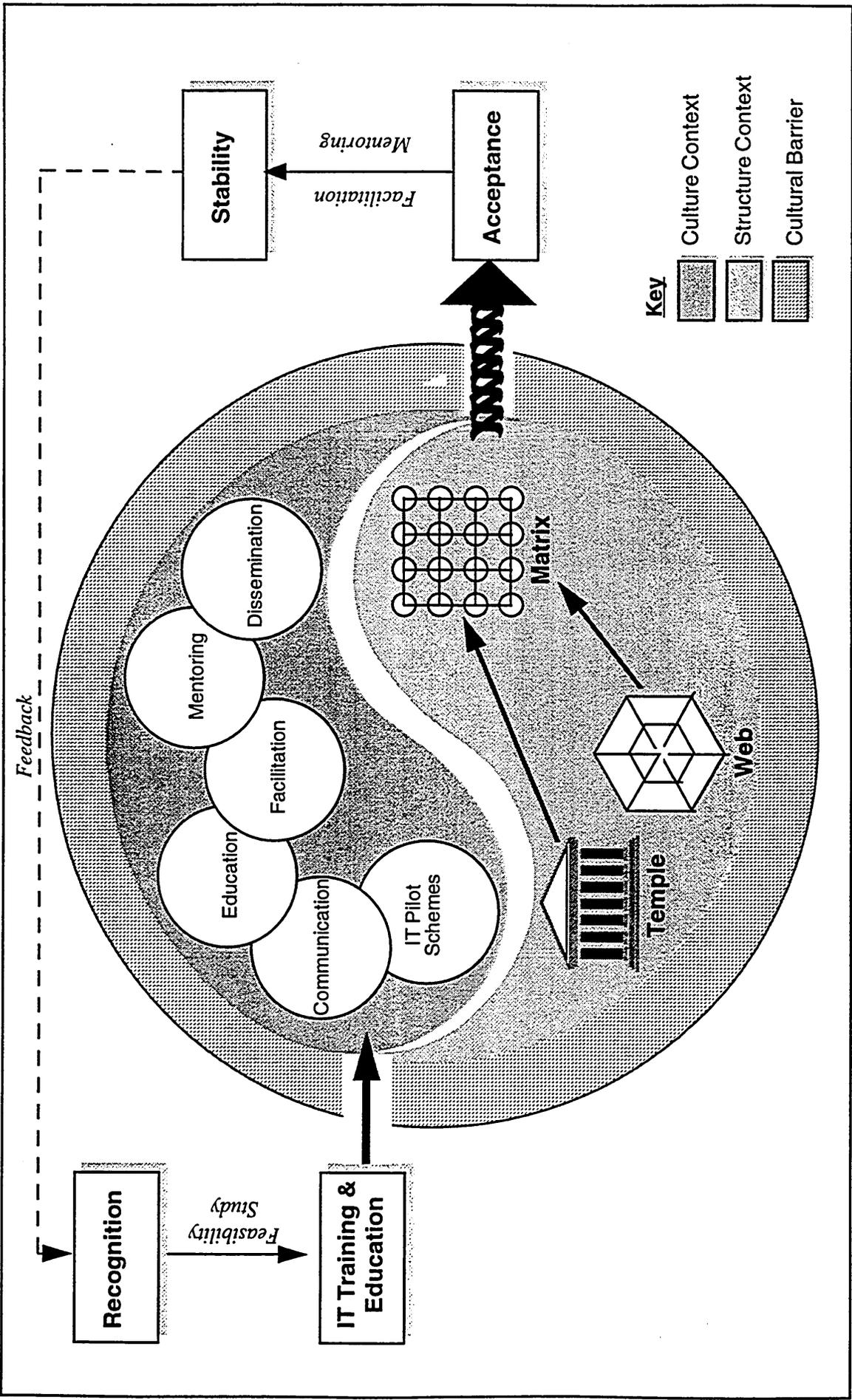
Conceptual Model, Original Version, Full Page

Conceptual Model, Revised Version, Full Page

Interview Schedule

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Geographical Location of Organisations



Recognition

Feasibility Study

IT Training & Education

Education

Facilitation

Mentoring

Dissemination

Communication

IT Pilot Schemes

Matrix

Temple

Web

Acceptance

Facilitation
Mentoring

Stability

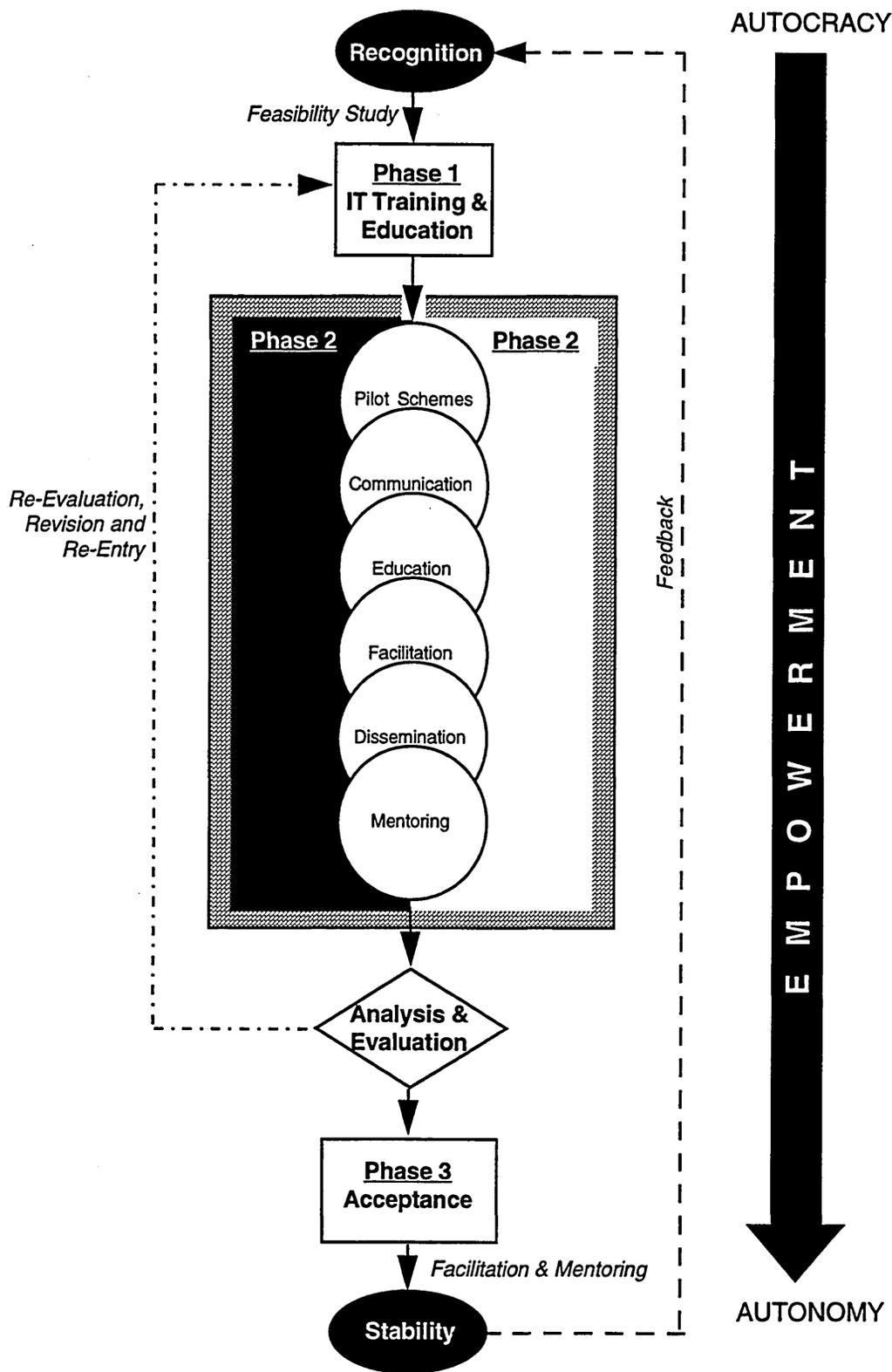
Feedback

Key

Culture Context

Structure Context

Cultural Barrier



<u>Notation Key</u>		<u>Phase 2 Key</u>	
	Action		Culture Context
	Decision		Cultural Barrier (incorporating Core Competency)
			Structure Context



PHD RESEARCH RESPONSE FORM

Candidate: Rajeev Kumar Bali

Thesis Title: Successful Technology Management: Cultural and Organisational
Dimensions of MIS implementation in SMEs

OVERVIEW

Interviewee(s):

Date:

Company Name:

Building/Street:

Area:

Town/City:

County:

PostCode:

Turnover (pa):

Employees:

Company Established:

Main Area(s) of Business:

ORGANISATION

Historical Basis of the firm: why and how was it formed?

Is firm part of a larger group? (If so, please provide name of group)

CULTURE

How would you describe the culture at this firm?

Are lines of communication effective?

Would you describe the culture as being autocratic, democratic, or autonomous?

Does the firm have a Mission or Vision statement?

Is it possible to have a copy of it?

Who wrote (or co-wrote the Statement)?

Is it realistic and /or working?

INFORMATION TECHNOLOGY

Who is / was in charge of the IT needs of this firm?

In the last 10 years, have any other IT projects taken place? (If so, please describe)

If so, how successful have these been?

Have these projects influenced the commencement of the MIS project?

Was the same consultant (or management team) used?

MANAGEMENT INFORMATION SYSTEM

Who is / was in charge of the implementation of the MIS?

If the person (or persons) in charge is now different, what skills and qualities did this person (or persons) bring to the project?

What did you hope to achieve by implementing the MIS?

Have these objectives been achieved?

Has the external consultants/facilitator's advice been followed?

How much of a say have existing management had?

How much of an understanding do top-line management have of IT?

Has this contributed to the success / failure of the project?

For the implemented MIS, please give an outline of the hardware and software procured?

Approximate total cost?

What did you hope to achieve by implementing the MIS?

If MIS is fully implemented, how would you rate the success (1=Bad, 5=Good)?

THE IMPLEMENTATION PROCESS

How did you prepare your staff, and yourselves, for the project?

Was there any resistance?

If so, how did you overcome this?

Were any cultural changes necessary (please detail)?

Were any organisational changes necessary (please detail)?

CONCEPTUAL MODEL

Is the Model concise and comprehensive?

Is the Model easy to follow?

Do you agree with the processes outlined?

Looking back on your experience, are there any changes you would make to the Model?

Would this Model be of any use to this organisation?

If accompanied by supporting documentation, could you have used the Model as part of your implementation process?

POST-IMPLEMENTATION

Looking back, is there any you would have done differently as part of your implementation?

Have there been additional benefits that you did not anticipate?

Have there been problems that you did not anticipate?

Have you any future plans for the system?

END

Conceptual Model: Notes

Raj Bali BSc(Hons), MSc
School of Engineering, Sheffield Hallam University

This document refers to the Conceptual Model (Ref.RKB/CM1) formed as part of a PhD research project.

Background

- UK-based SMEs face a range of varied external pressures.
- Examples of IT pressures include: replacing legacy systems or the need to meet Y2K (Year 2000) compatibility.
- These pressures mean the organisation must change the way its internal processes and procedures are carried out.
- These changes almost always face resistance from staff within the organisation.
- Resistance to impending change may not always be of human origin.
- Physical infrastructure (ie. unsuitable workshop layout for automated manufacture techniques) or internal working procedures within the organisation can be incapable of accommodating the proposed change.
- Resistance to change can take one of two forms:
 - organisational resistance (eg. unsuitable structure, ill-defined corporate objectives and poor communication)
 - human resistance (eg. fear of the unknown, a lack of understood beliefs, lack of trust, self-interest and disrupting established routines)

Phase 1: Recognition

- The first stage is for management (either independently or after meeting the external consultants) to *recognise* that change is necessary.
- Once this key stage has been acknowledged, to make inroads into changing the existing culture.
- Work can then begin on identifying key areas of the organisation where "attitude, belief and value" change will be crucial to the success of the System.

Phase 2: IT Training and Education

- A definition of the extent of training and education is required in order to facilitate the penetration of the cultural barrier.
- Penetration of this barrier is perhaps the easiest phase of the culture-change process.

Phase 3: Cultural and Organisational Change

- The mechanics of the change process in SMEs is non-linear in its outlook and the multi-faceted approach carries out many varied tasks simultaneously.
- As depicted on the Model, these processes are:

IT Pilot Schemes	-	trial systems to demonstrate functionality
Communication	-	contact and interaction with colleagues
Education	-	teaching merits of the new MIS
Mentoring	-	guidance and reference from IT managers
Facilitation	-	"hand-holding" and full openness with IT managers
Dissemination	-	letting people know how the implementation is progressing

- The role of the organisation's structure is also germane to the change process. As in the case of humans, resistance can occur.
- Procedures may be so well established that moving to a new, unfamiliar, way of working will meet with resistance from the persons who will be operating the new procedures.
- The anticipated advantages of introducing new technology into organisations include the improvement of the organisation's efficiency and effectiveness.
- SMEs need to be flexible, communicative, functional and efficient and hence many of the cultural changes necessary are tied in with a shift to a matrix structure.

Phase 4: Acceptance (and the Elastic Arrow)

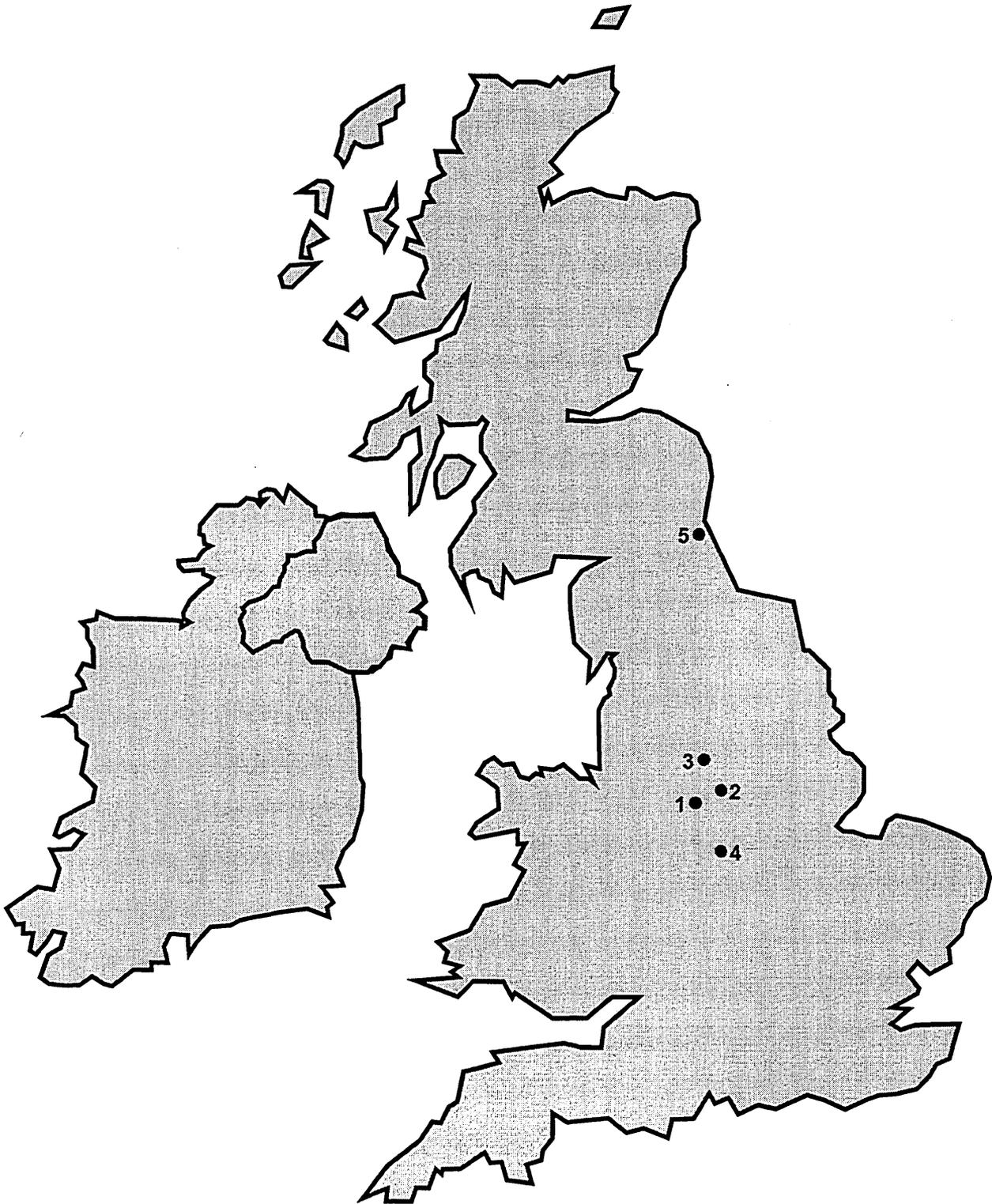
- Having carried out Phase 3, the organisation attempts to progress to the acceptance stage.
- The "out-bound" arrow possesses "elastic" properties, ie. it is resilient and will resist attempts to stretch beyond its means.
- The acceptance stage can be regarded as a "buffer-zone".
- Any resistance encountered at this stage is indicative of an ineffective change program, highlighting deficiencies within the cultural confines of the organisation.
- The cultural barrier can be re-entered (via the arrow) if necessary.

Phase 5: Stability

- The framework takes an evolutionary route to the Stability stage.
- The route to this stage should be supported by further facilitation, dissemination and communication.

Phase 6: Recognition revisited

- Having achieved the objective of attaining a new culture, the organisation may, given time and experience, return to its original starting position.
- Management may once again recognise that a culture-change may be necessary.



Location Key

- | | | |
|---|-----------|---------------|
| 1 | Thermo-X | nr. Sheffield |
| 2 | Company A | Sheffield |
| 3 | Company B | Barnsley |
| 4 | Company C | Derby |
| 5 | Company A | Gateshead |

Appendix B

Appendix B: Raw Data
Interview Schedules, Completed Originals



PHD RESEARCH RESPONSE FORM

Candidate: Rajeev Kumar Bali
Thesis Title: Successful Technology Management: Cultural and Organisational
Dimensions of MIS implementation in SMEs

OVERVIEW

Interviewee(s): *IT Manager*

Date: *24 July 1998*

Company Name: *Company A*

Building/Street: *—*

Area: *—*

Town/City: *SHEFFIELD*

County: *SOUTH YORKS.* PostCode: *—*

Turnover (pa): *£2-25m p/a* Employees: *~50*

Company Established: *1841*

Main Area(s) of Business: *FLUID TRANSFER EQUIPMENT.*

ORGANISATION

Historical Basis of the firm: why and how was it formed? *as detailed on*

company history sheets as provided to self

Is firm part of a larger group? (If so, please provide name of group) *NO.*

CULTURE

How would you describe the culture at this firm? *organisationally, very "old-school", v. blue-collar*

v. white collar. IT manager trying to raise with shopfloor (them + us), too much history in place and a top-down approach is :: necessary

Are lines of communication effective? *Horizontal communication good. vertical comm. is directed from/towards chairman & directors only.*

Would you describe the culture as being autocratic, democratic, or autonomous?

autocratic, but changing.

Does the firm have a Mission or Vision statement? *NO.*

Is it possible to have a copy of it? *NO*

Who wrote (or co-wrote the Statement)? *NO*

Is it realistic and / or working? *NO*

but, culture is changing.

INFORMATION TECHNOLOGY

Who is / was in charge of the IT needs of this firm? *office administrator, now, IT manager*

In the last 10 years, have any other IT projects taken place? (If so, please describe)

* *UNIX - legacy system transferred from old site
ETAX MIS bought in 1993, but not effectively implemented*

If so, how successful have these been? *not at all, not properly effective.
only for Net/SP, figures inaccurate*

Have these projects influenced the commencement of the MIS project? *Yes, needed extra functionality.*

Was the same consultant (or management team) used? *NO.*

* *UNIX replaced 15 years ago.
TETRA package on UNIX boxes.*

→ not Y2K compliant

MANAGEMENT INFORMATION SYSTEM

Who is / was in charge of the implementation of the MIS? *IT (systems) manager*

If the person (or persons) in charge is now different, what skills and qualities did this person (or persons) bring to the project? *IT background in integrated manufacturing systems.*

What did you hope to achieve by implementing the MIS? *stock levels down.*

- *turnover up*
- *↑ flow of information*
- *↑ vision over WIP*
- *↑ reporting tools*
- *increase efficiency*
- *↑ comms to cust & supp*
- *↑ internal organisations*
- *centralised database*
- *↑ production planning*
- *↑ vision, planning & control*

OR Have these objectives been achieved? *Yes, except from stock levels. But, correct items are now in stock, but credit valuation has not gone down.*

Has the external consultants/facilitator's advice been followed? *Yes, via a collaborative view.*

How much of a say have existing management had? *→ Finance Director has had input on suggestions / plans
→ prod manager's experience*

How much of an understanding do top-line management have of IT? *NONE.*

Has this contributed to the success / failure of the project? *Yes, as have been led by "experts".*

For the implemented MIS, please give an outline of the hardware and software procured? *NT Server, 15 PCs, win 95, impact encore & ms office.*

Approximate total cost? *~£55K*

What did you hope to achieve by implementing the MIS? *as above*

If MIS is fully implemented, how would you rate the success (1=Bad, 5=Good)? *4*

OR → *there has remained state (cas of stock).
→ strong pound has affected exports*

THE IMPLEMENTATION PROCESS

How did you prepare your staff, and yourselves, for the project? *Communicating*

aims & objectives & explaining Associates's presence at the firm.

Was there any resistance? *old system was dying & some people thought that previous IT was lacking but that new will be better*

If so, how did you overcome this? *Explaining & re-assuring to people.*

It will stop the constant "fire-fighting".

Were any cultural changes necessary (please detail)? *Culture has changed (eg.*

communication has become much more effective).

Were any organisational changes necessary (please detail)? *works manager added.*

storeman sacked. also, sales and production functions are now more integrated.

CONCEPTUAL MODEL

Is the Model concise and comprehensive? *Fairly concise*

Is the Model easy to follow? *When accompanied by guidance notes, yes.*

OR Do you agree with the processes outlined? *on the whole, yes.*

Looking back on your experience, are there any changes you would make to the Model?

IT Aided - the fix in old system meant that the schemes - firm could move quickly to the new package

In principle, agree with the constructs, but time for implementation meant that company couldn't do it.

Would this Model be of any use to this organisation? *Yes.*

If accompanied by supporting documentation, could you have used the Model as part of your implementation process? *most probably.*

OR *half-half split is good.*

POST-IMPLEMENTATION

Looking back, is there any you would have done differently as part of your implementation? *Yes, would have incorporated:*

- IT Pilot Schemes*
- pre-implementation training.*

Have there been additional benefits that you did not anticipate? *Spin-off projects like automation (faxing & emailing).*

Shopfloor data collection

Have there been problems that you did not anticipate? *Sheer lack of quality information,*

data-entry was time-consuming.

Have you any future plans for the system? *Constant development of the system will reduce chances of obsolescence.*

END





PHD RESEARCH RESPONSE FORM

Candidate: Rajeev Kumar Bali

Thesis Title: Successful Technology Management: Cultural and Organisational Dimensions of MIS implementation in SMEs

OVERVIEW

Interviewee(s): Production manager
IT manager

Date: 26 June 1998

Company Name: Company B

Building/Street: _____

Area: _____

Town/City: BARNSELEY

County: S. YORKSHIRE

PostCode: _____

Turnover (pa): £4m

Employees: ~95
(120 over summer period)

Company Established: after 2nd war, in SME form, in 1990 converted to plc

Main Area(s) of Business: educational & office furniture
& stadium seating

ORGANISATION

Historical Basis of the firm: why and how was it formed? *Supplies to
Crown purch. org.*

*central purchasing body for all schools in UK.
large contract after collapse of Crown. (1990). took
over distribution & sales. and are therefore a
contract manufacturer at present.*

Is firm part of a larger group? (If so, please provide name of group) *NO.*

CULTURE

How would you describe the culture at this firm? *traditional manufacturing.
performance-index.*

*has been hierarchical, is now becoming flatter
more empowered, TCS and new mo has helped this.*

Are lines of communication effective? *is improving*

Would you describe the culture as being autocratic, democratic, or autonomous?

democratic now, prior to TCS, was autocratic.

Does the firm have a Mission or Vision statement? *"Survival", obviously
not formal.*

Is it possible to have a copy of it? *N/A.*

Who wrote (or co-wrote the Statement)? *N/A*

Is it realistic and / or working? *N/A*

INFORMATION TECHNOLOGY

Who is / was in charge of the IT needs of this firm?

Finance Director
(not and)

In the last 10 years, have any other IT projects taken place? (If so, please describe)

CAD installation (1995), payroll system (1993),
+ several in-house databases.

If so, how successful have these been?

mixed as CAD/payroll were
successful, in-house dbases were
mixed.

Have these projects influenced the commencement of the MIS project?

Yes.

Was the same consultant (or management team) used?

Yes. (but MD has
changed.)

Chairman / MD → MD appointed in January 1998.
MD has responsibilities from Chairman.

MANAGEMENT INFORMATION SYSTEM

Who is / was in charge of the implementation of the MIS?

IT manager &
Finance Director

If the person (or persons) in charge is now different, what skills and qualities did this person (or persons) bring to the project?

academic qualifications & experience

What did you hope to achieve by implementing the MIS?

- improve m/cross.

- improvements to planning
- quicker turnaround to get info to staff
- report requirements &
- IT forecasting

Have these objectives been achieved?

Yes, 85% have

Has the external consultants/facilitator's advice been followed?

not always.

How much of a say have existing management had?

hands-off
approach

How much of an understanding do top-line management have of IT?

new one has
good
understanding.

Has this contributed to the success / failure of the project?

Yes.

For the implemented MIS, please give an outline of the hardware and software procured?

Intranetware & PCs.

Approximate total cost?

£20K+

What did you hope to achieve by implementing the MIS?

as above.

If MIS is fully implemented, how would you rate the success (1=Bad, 5=Good)?

4

THE IMPLEMENTATION PROCESS

How did you prepare your staff, and yourselves, for the project? *presentations to MD & management. Windows '95 training course for all staff. & regular meetings.*

Was there any resistance? *NO.*

If so, how did you overcome this? *N/A*

Were any cultural changes necessary (please detail)? *toward email & internet, access & intranet use functionality*

Were any organisational changes necessary (please detail)? *Streamlining of tasks & jobs - a "revolutionary" process.*

CONCEPTUAL MODEL

Is the Model concise and comprehensive? *Yes.*

Is the Model easy to follow? *Yes (if with explanation).*

Do you agree with the processes outlined? *Yes*

Looking back on your experience, are there any changes you would make to the Model?

*There must be a point. What the company
change agent must break out of the cultural
barrier.*

Would this Model be of any use to this organisation? *Yes.*

If accompanied by supporting documentation, could you have used the Model as part of your implementation process? *Yes*

POST-IMPLEMENTATION

Looking back, is there any you would have done differently as part of your implementation?

more training

more communication

Have there been additional benefits that you did not anticipate? email

Internet.

general improvement in office efficiencies.

Have there been problems that you did not anticipate? feeling

problems which have since been overcome.

Have you any future plans for the system? MICROSOFT (windows-based)

- to user-friendly software.

- efficiency

- esp on sales side

END



PHD RESEARCH RESPONSE FORM

Candidate: Rajeev Kumar Bali

Thesis Title: Successful Technology Management: Cultural and Organisational Dimensions of MIS implementation in SMEs

OVERVIEW

Interviewee(s): *IT manager*

Date: *3/7/98*

Company Name: *COMPANY C*

Building/Street:

Area:

Town/City: *Derby*

County: *Derbyshire*

PostCode: *—*

Turnover (pa):

~£10m p/a.

Employees:

200

Company Established: *1953*

Main Area(s) of Business:

medical disposable products

ORGANISATION

Historical Basis of the firm: why and how was it formed?

as detailed on page 2 of company

catalogue

Is firm part of a larger group? (If so, please provide name of group) *NO.*

4

CULTURE

How would you describe the culture at this firm? *Fairly autocratic*

because of family owned business & links.

Are lines of communication effective? *could be better*

Would you describe the culture as being autocratic, democratic, or autonomous?

autocratic

Does the firm have a Mission or Vision statement? *Yes*

Is it possible to have a copy of it? *Yes.*

Who wrote (or co-wrote the Statement)? *Managing Director & Quality manager*

Is it realistic and / or working? *in parts, yes.*

INFORMATION TECHNOLOGY

Who is / was in charge of the IT needs of this firm? *prior to this MIS. no-one in overall charge.*

In the last 10 years, have any other IT projects taken place? (If so, please describe)

Accounts, Sales, Purchasing, Stock computerisation was ineffectual, SAGE implementation was v. constructive

If so, how successful have these been? *okay until? company grew & then systems couldn't cope*

Have these projects influenced the commencement of the MIS project? *Yes.*

Was the same consultant (or management team) used? *NO. TCS embarked with Associate & Academic guidance*

* *prior to scheme, 20 PCs in place. at time of interview, 35-40 in place, with plans for 15-20 more soon.*

MANAGEMENT INFORMATION SYSTEM

Who is / was in charge of the implementation of the MIS? *IT manager*

If the person (or persons) in charge is now different, what skills and qualities did this person (or persons) bring to the project? *Additional benefits of TCS.*

What did you hope to achieve by implementing the MIS? *continued company growth*

- survival (with hindsight)
 - remain competitive
 - effective stock control (↓ stock)
 - planning assistance
 - reporting features
 - management information
 - quotations
 - ↓ time-to-market.
-

Have these objectives been achieved? *Yes, still room for improvement*

Has the external consultants/facilitator's advice been followed? *Yes.*

How much of a say have existing management had? *Theatre Pack Manager & MD have had input and approval*

How much of an understanding do top-line management have of IT? *very little, but understand they have to have it.*

Has this contributed to the success / failure of the project? *Yes.*

For the implemented MIS, please give an outline of the hardware and software procured?

*8 PCs (DX2/665) + acc. RAM upgrades
peer-to-peer network*

Approximate total cost? *£13K (Access) / £25-30K (hardware/software)*

What did you hope to achieve by implementing the MIS? *as above*

If MIS is fully implemented, how would you rate the success (1=Bad, 5=Good)? *4*

α + £1000 for double-sided printer

THE IMPLEMENTATION PROCESS

How did you prepare your staff, and yourselves, for the project? ^{training}
(during & after)

- talking / communication
- involvement
- improving stock control
- finding problems first
- feedback
- exploring implications relevance

Was there any resistance? ^{purchasing dept was a problem, 'cas}
^{of training & parallel processing}

If so, how did you overcome this? ^{- selling merits of the system}
^{- demonstrating how it could help}

- flexibility from IT manager's perspective ^{- less fire fighting}
- showing concerns & taking on board complaints

Were any cultural changes necessary (please detail)? ^{- opening people's minds}
^{- integrated perspective}

- wheels within wheels

- "all singing from same hymn sheet"

Were any organisational changes necessary (please detail)? ^{3 movements in}
^{purchasing, re-deployed}
as IAs. add'l movements in staff.
- procedures & training records

Young department, average age of 28-30.

CONCEPTUAL MODEL

Is the Model concise and comprehensive? *Yes.*

Is the Model easy to follow? *Yes.*

Do you agree with the processes outlined? *- unsure if org. needs to change
- matrix structure needed?*

Looking back on your experience, are there any changes you would make to the Model?

organisational charts & change not as applicable

here perhaps but existence of "spring"

arrow helps.

Would this Model be of any use to this organisation? *possibly, again org. structs.
not as relevant.*

If accompanied by supporting documentation, could you have used the Model as part of your implementation process? *Yes.*

POST-IMPLEMENTATION

Looking back, is there any you would have done differently as part of your implementation?

Systems analysts and design needs to be somewhere

Have there been additional benefits that you did not anticipate? ^① People's

acceptance of IT is strong. ^② It benefits them

^③ more to another MIS will be easier.

Have there been problems that you did not anticipate? ^① people are now

"addicted" ^② now want more, very demanding

^③ split-child syndrome.

Have you any future plans for the system? moreover to Sovereign or

expansion & tuning Access, High manufacturing

planning & introducing touch-screens with photographs.

END



PHD RESEARCH RESPONSE FORM

Candidate: Rajeev Kumar Bali

Thesis Title: Successful Technology Management: Cultural and Organisational Dimensions of MIS implementation in SMEs

OVERVIEW

Interviewee(s): Y2K MANAGER / IT MANAGER

Date: 23 SEPTEMBER 1998

Company Name: "COMPANY D"

Building/Street: _____

Area: _____

Town/City: GATESHEAD

County: TYNE & WEAR

PostCode: _____

Turnover (pa): £5 MILLION

Employees: 80

Company Established: LATE 1970S

Main Area(s) of Business: DISTRIBUTION - FOOD AND CRAFTS.

ORGANISATION

Historical Basis of the firm: why and how was it formed? COMPANY HAS

BASIS IN CHRISTIAN ETHOS OF 'FAIR-TRADING' AND
WAS FORMED TO PROVIDE A COMMERCIAL OUTLET
FOR ITS PRODUCTS

Is firm part of a larger group? (If so, please provide name of group) NO.

CULTURE

How would you describe the culture at this firm? *Christian-ethos based.*

After 20 years of trading, the reason for existence remains the same

Are lines of communication effective? *Varies widely. Depends on the (un)effectiveness of executives*

Would you describe the culture as being autocratic, democratic, or autonomous?

good balance of autocracy & autonomy

Does the firm have a Mission or Vision statement? *Yes*

Is it possible to have a copy of it? *Yes*

Who wrote (or co-wrote the Statement)? *Board members*

Is it realistic and / or working? *Yes*

* The "Company D's" aim is to fight poverty through trade.

Additionally, to double its impact by the year 2002

INFORMATION TECHNOLOGY

Who is / was in charge of the IT needs of this firm? *NOW - IT & Y2K MANAGER.
PREVIOUSLY - FINANCE DIRECTOR*

In the last 10 years, have any other IT projects taken place? (If so, please describe)

BPR-related programme links into IT requirements.

If so, how successful have these been? *VARIOUSLY SUCCESSFUL*

Have these projects influenced the commencement of the MIS project? *Yes.*

Was the same consultant (or management team) used? *NO.*

In 1995-1996, a BPR exercise (overseen by the Finance Director & IT manager) was carried out. This was variously (un)successful. There are some "sacred cows" which will not be removed - or at least with great difficulty. Changing beliefs is very difficult. These projects have governed the start of the new IT project -

Some elements of the BPR was easier than others. Motivation was often (and easily) lost. BPR exercise identified problem areas to start with at the beginning of the project.

mentality for change has now changed as well.

Different management leaders (or companies) were used.

Continued →

OUT (1.910.000) CONSULTANCY) WAS USED, ~~FOR~~ TO SUPPORT
a lot of in-house expertise. OCP provided:
several IT tools & techniques to better and
Company D's objectives. Proportionately little
consultant time was used.

Company D found that their in-house expertise
was sufficient & superior to certain consultants
hired on a probationary period. (eg. KIDSON-
IMPEY). Confidence was lost as different
consultancies quoted vastly differing times
and prices for the same tasks - from 2
afternoons to a full year.

Several internal power struggles led to
a few false starts. The Finance Director
left (as did the previous IT manager).
Since their departure, project progress has
been expedited.

Dist. Manager was present since the inception of
the project & has witnessed first-hand how
resistance has set-in.

MANAGEMENT INFORMATION SYSTEM

Who is / was in charge of the implementation of the MIS?

17/42U
Manager

If the person (or persons) in charge is now different, what skills and qualities did this person (or persons) bring to the project? *Internal politics made for a difficult implementation*

What did you hope to achieve by implementing the MIS? *bespoke systems not 42U compatible. Bespoke system*

has been written in-house & so confusion can set in for maintenance purposes. program may become outdated as the business expands. also, company wanted better reports and 7d access to information

Have these objectives been achieved?

The benefits are starting to be seen

Has the external consultants/facilitator's advice been followed?

Yes, via a

phased implementation

How much of a say have existing management had?

Have had more opportunity than has been taken up.

How much of an understanding do top-line management have of IT?

Minimal.

Has this contributed to the success / failure of the project?

Yes. since the finance Director has left.

For the implemented MIS, please give an outline of the hardware and software procured?

SSA, BPCS man. software, run on a UNIX server, 50-users, 3 servers (1) BPCS (2) NT (3) legacy

Approximate total cost?

£250K

What did you hope to achieve by implementing the MIS?

as above

If MIS is fully implemented, how would you rate the success (1=Bad, 5=Good)?

4

THE IMPLEMENTATION PROCESS

How did you prepare your staff, and yourselves, for the project? *Key-user groups (from state-of-requirements)*

spoken to managers to support key-users in few areas. various degrees of success, reporting to board, test-data formed prototype system.

Was there any resistance? *Yes, from management re-amount of time it would take, some areas are on, others not.*

If so, how did you overcome this? *a lot of "show it & see", some is just hard word persuasion. Key user-groups are also pressuring their management. also, some managers can spend 60% on IT key-use, but can expect 100% on the job.*

Were any cultural changes necessary (please detail)? *Yes, as resistance*

to change had set in.

Were any organisational changes necessary (please detail)? *Yes. The key-*

users groups are a stable group that have been in force for a while

CONCEPTUAL MODEL

Is the Model concise and comprehensive? Yes

Is the Model easy to follow? Yes

Do you agree with the processes outlined? Yes (see notes).

Looking back on your experience, are there any changes you would make to the Model?

organizational change is not as important here. on a technical basis, some jobs/tasks are better.

IT communication has been pitched on

an organizational level.

Would this Model be of any use to this organisation? Yes, esp. in BPR stages.

If accompanied by supporting documentation, could you have used the Model as part of your implementation process? Yes, simplification would help.

* - model would work well with IT staff.

- senior management still have the problem
- empowerment. authority figures may see this as "washing their hands" of responsibility.

POST-IMPLEMENTATION

Looking back, is there any you would have done differently as part of your implementation?

too much time taken deliberating.

Faith was lost with management for Shopfloor personnel.

Have there been additional benefits that you did not anticipate? User-

participation has been enhanced (now).

Have there been problems that you did not anticipate? time taken

for consultant's time.

Have you any future plans for the system? Staged implementations

for mission-critical systems - accounts,

marketing, purchasing, logistics, telegales and despatch.

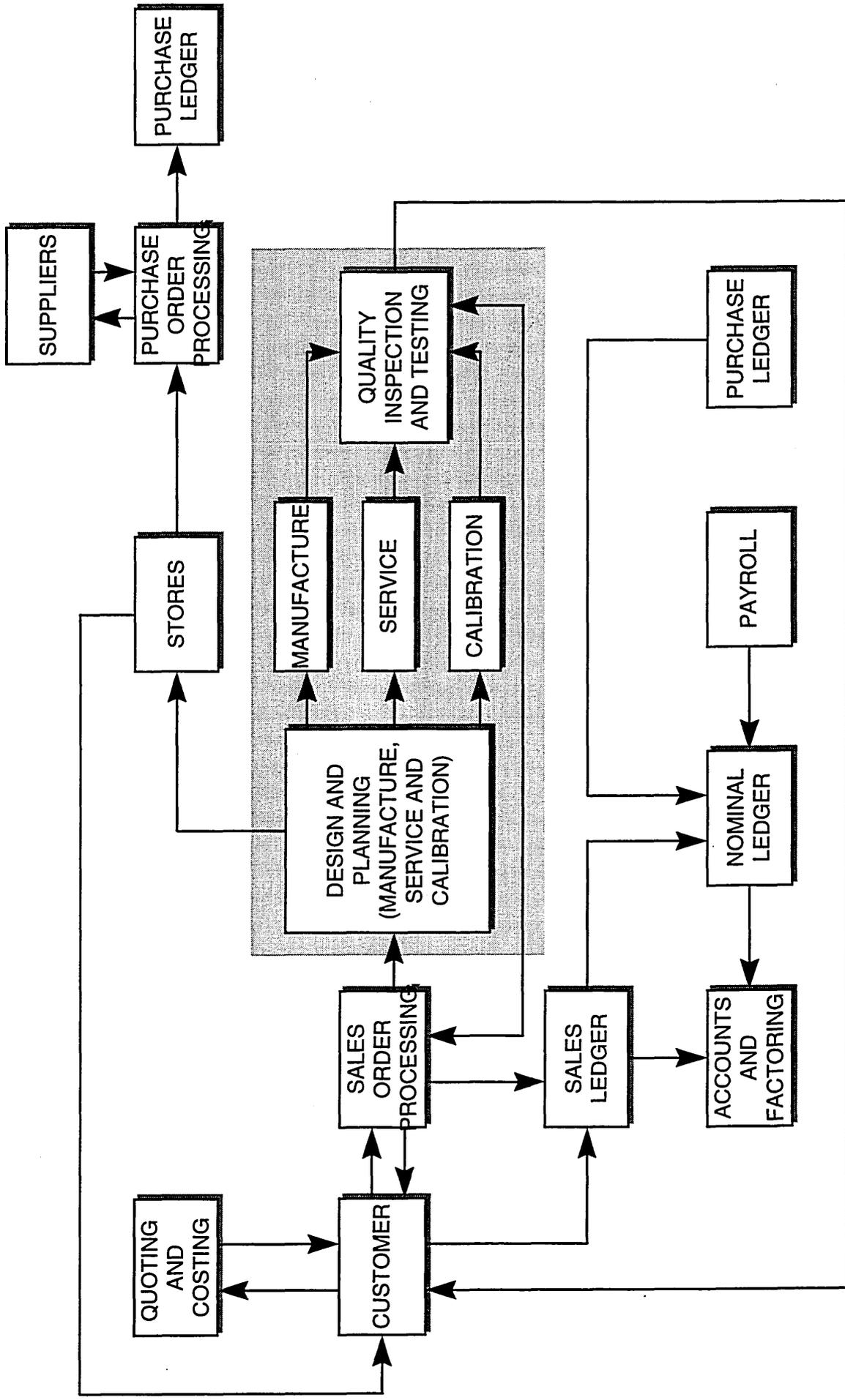
END

f-addⁿ training has been organised with a local college.
-addⁿ PSAT level qualifications to be gained
-a sense of a "proper", professional implementation.

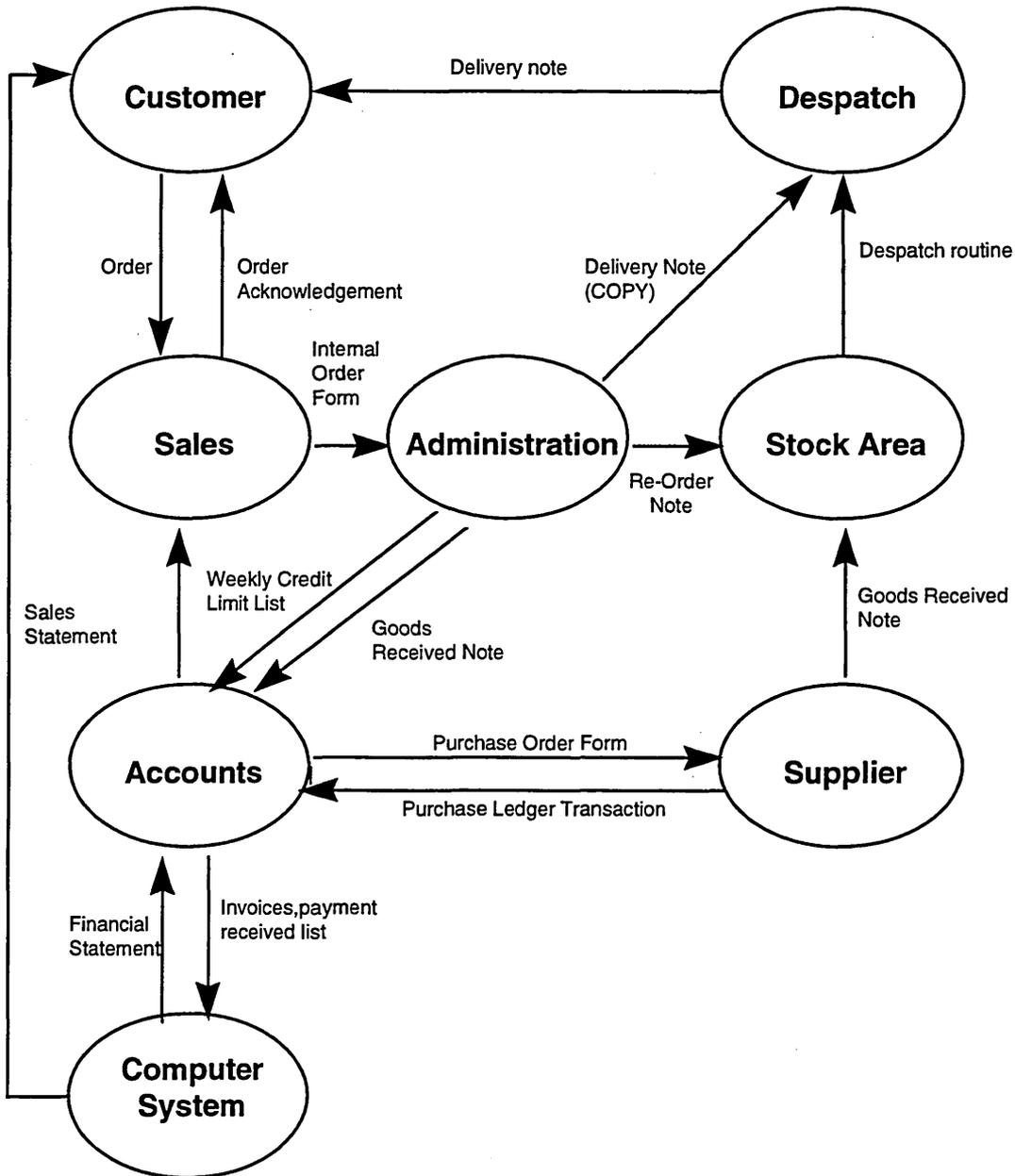
Appendix C

Appendix C: Thermo-X Systems Analysis
Analysis and Design Diagrams
Thermo-X : SSADM Schematics
Thermo-X : SSM Schematics

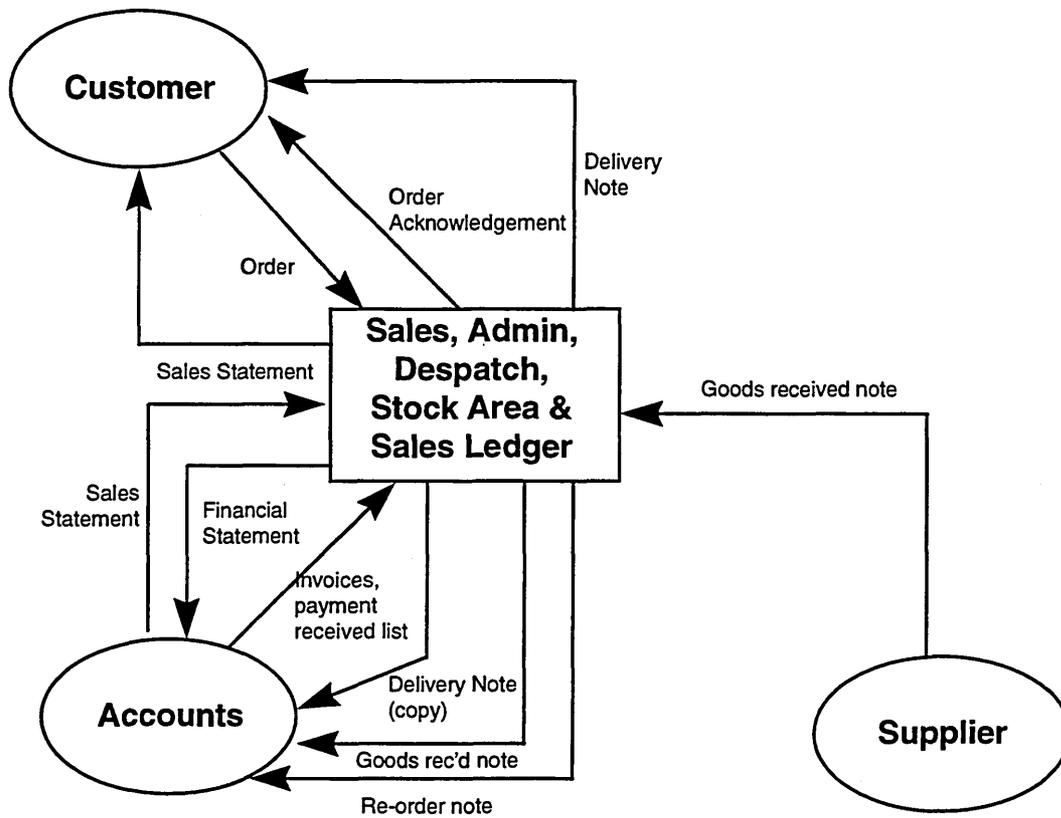
Process Flow Diagram (New System)



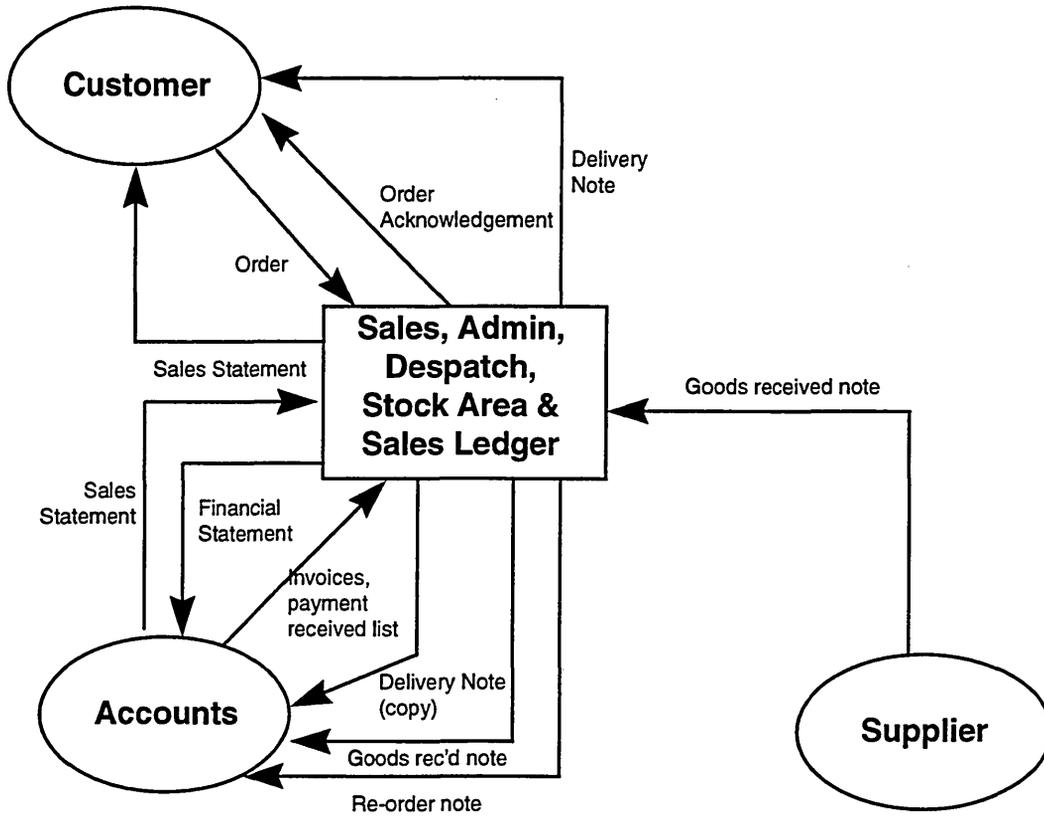
Document Flow Diagram (Old System)



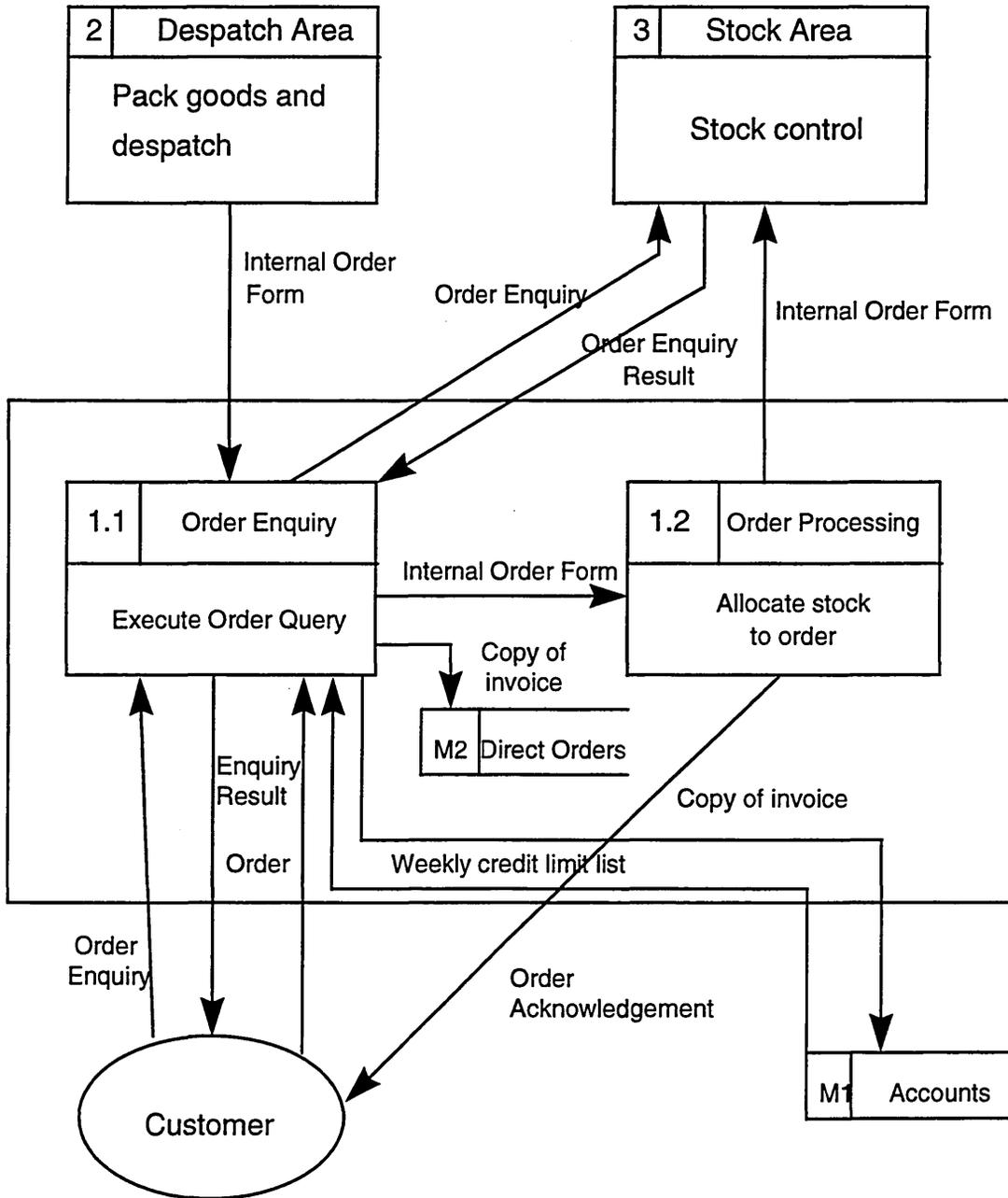
Data Flow Diagram: Level 0-Context (Old System)



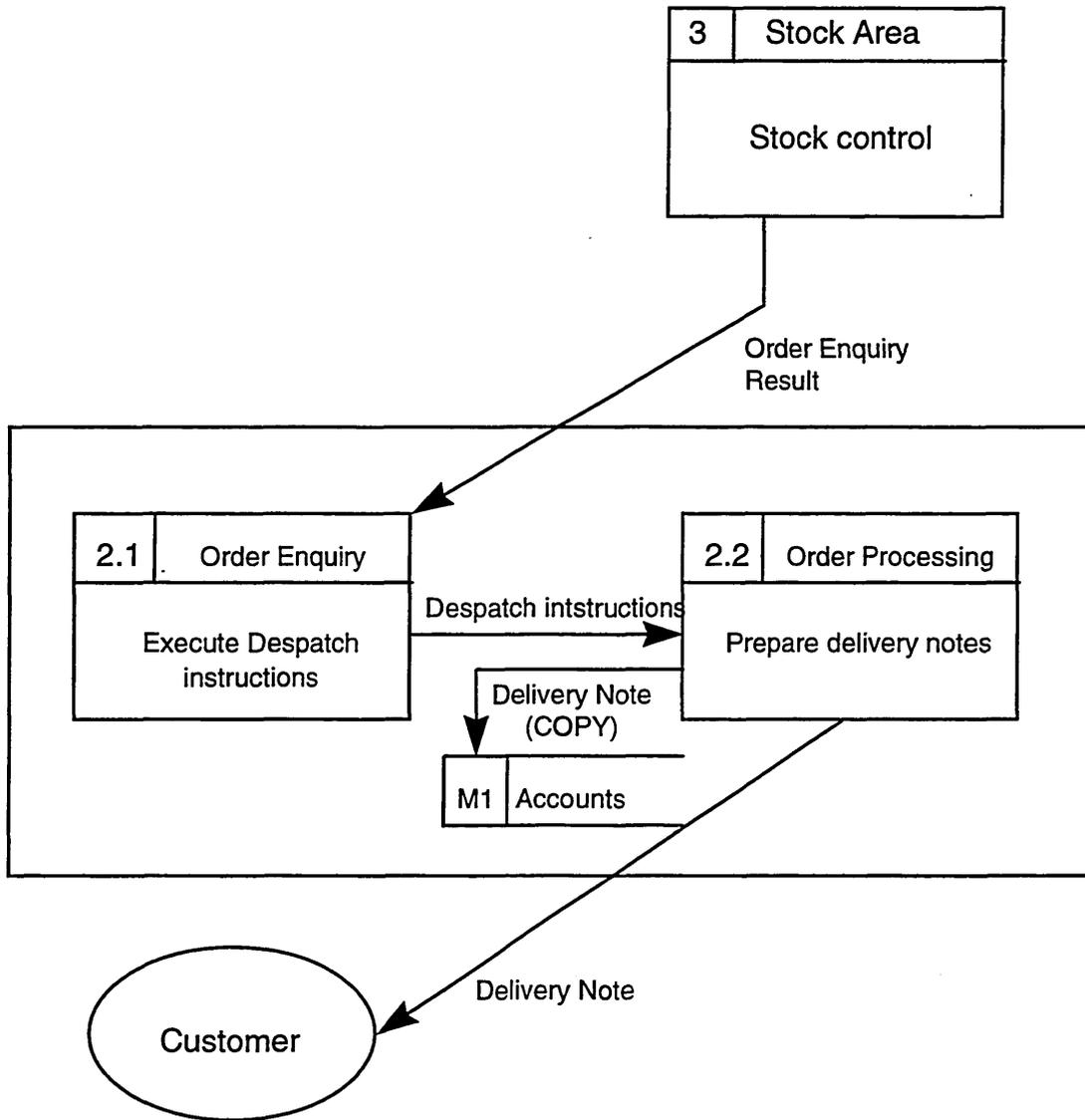
Data Flow Diagram: Level 0-Context (Old System)



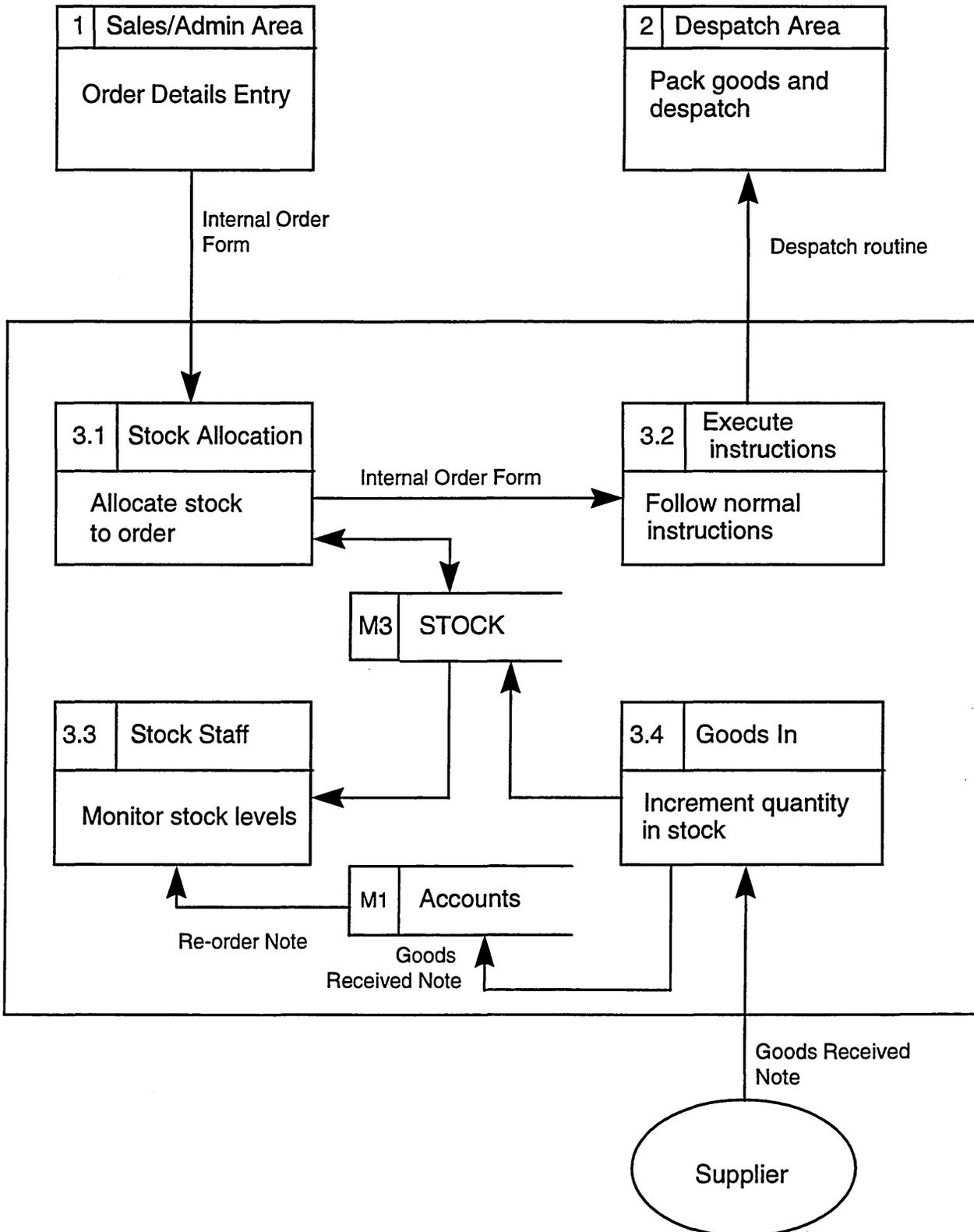
Data Flow Diagram: Level 2 (Old System)



Data Flow Diagram: Level 2 (Old System)

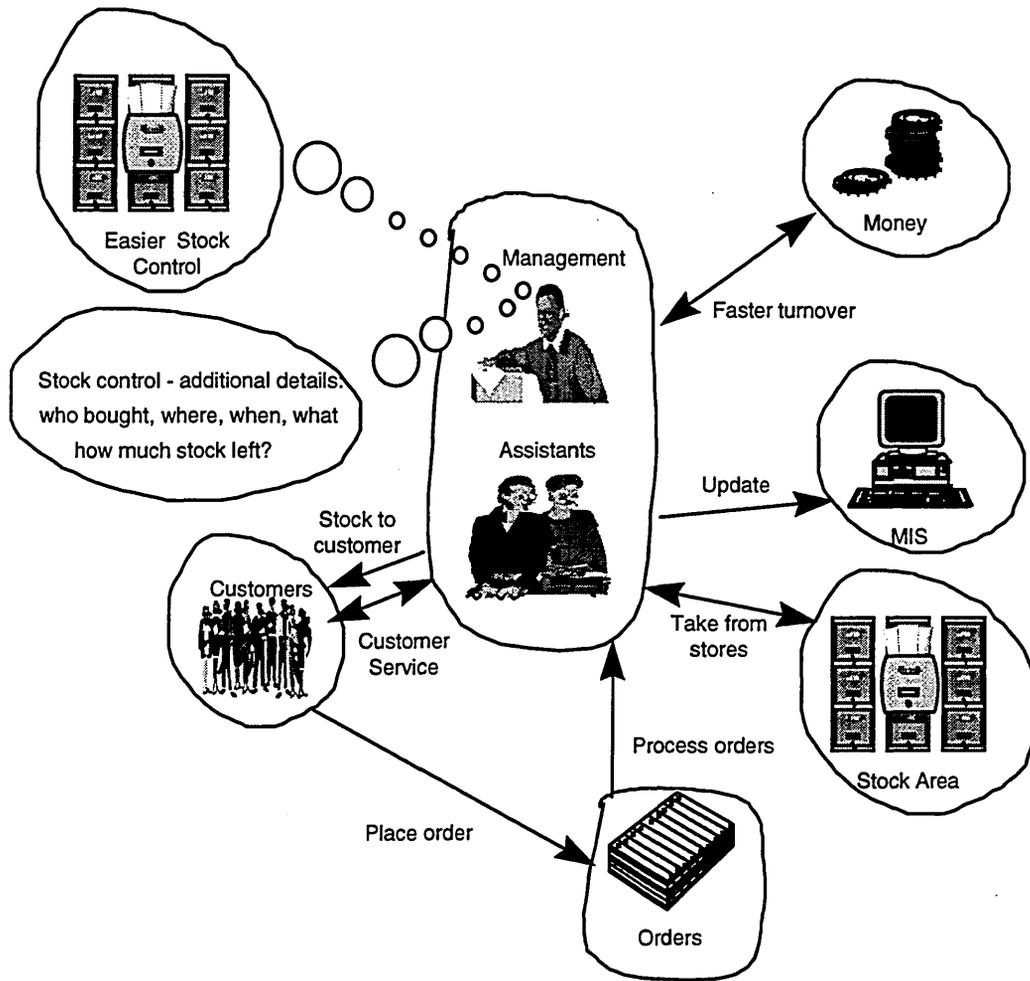


Data Flow Diagram: Level 2 (Old System)



Soft Systems Methodology (SSM)

Rich Picture (New System)



TO DISPLAY INFORMATION FROM OTHER SECTIONS

- (1) Choose Options/Diary.
- (2) Choose Show.

The Organizer displays the Diary Options (Show) dialog box.

- (3) Click each section that contains entries you want to show in the Diary.
- (4) Choose OK twice.

NB: If the Diary view does not have enough space to show all the day's information, use the view icons below the Toolbox to change to the day-per-page view .

The "To Do" (or Task) List

The tasks on your to do list form the core of your weekly and long-range planning. Lotus Organizer provides a section devoted to managing these tasks. The To Do section can help you keep track of what you have to do and when you have to do it.

As your ideas and projects evolve, you can add, update, or delete To Do tasks to reflect these changes. As you proceed, you can keep track of which tasks are done and which are pending. You can also have your To Do tasks displayed in the Diary, without having to retype or copy them there.

You can easily enter and edit tasks in your To Do section. The tasks you enter in your To Do list are automatically sorted and displayed according to date and priority.

In the To Do section, you can:

- Create To Do tasks
- Edit tasks
- Change start and due dates
- Prioritize tasks
- Mark tasks completed
- Show To Do tasks in your Diary

CREATING A TO DO TASK

You can enter as many tasks as you like in your To Do section. Your To Do list displays all your tasks on a page and, if necessary, creates more pages that you can turn to.

In the To Do section you can:

Enter To Do tasks

Delete To Do tasks that you've completed or that you no longer need

Change the start and due dates

Prioritize tasks

Mark tasks as completed

To enter a To Do task

- (1) Click the To Do section tab
The Organizer displays the first To Do page.
- (2) Click the To Do page
The Organizer displays the To Do dialog box.
- (3) Type a description of the task.
- (4) Specify start and due dates for the task if needed.
The Organizer automatically displays today's date for these dates unless you change them. You can type a date or choose a date from the pop-up diary.
- (5) Select any of the following options.

Priority

Specifies a priority for the task. The Organizer automatically assigns a priority of 2.

Completed

Specifies that a task has been completed.

Confidential

Selects whether the task can be read or edited. Access to confidential tasks is determined by what password (if any) you use to open the file.

- (6) Choose OK
The task appears on the To Do page.

TO DELETE A TASK

Drag and drop the task into the Trash .

NB: You can retrieve the deleted task by choosing Edit/Undo before you delete something else.

EDITING A TASK

- (1) Click the task
The Organizer displays the To Do dialog box.
- (2) Edit the task description or change any of the other options, as appropriate, or mark the task completed.
- (3) Choose OK.

CHANGING START AND DUE DATES

Each task is coded so you can see its status at any time. The following table describes how a task appears, based on its status.

Colour screen	Status
Red	Overdue
Green	Current
Blue	Future
Red line through task	Completed

Tasks are sorted by date, then by priority. Every day the Organizer checks to see if any of your To Do tasks are overdue. Overdue tasks appear first, followed by current tasks and future tasks. Completed tasks appear at the bottom of your list.

To change start and due dates

- (1) Create or edit a To Do task.
- (2) Specify start and end dates as appropriate. You can type a new date or choose a date from the pop-up diary.
- (3) Choose OK.

PRIORITIZING A TASK

You can assign a priority to each task in your To Do list so you can easily see which tasks are most important. Tasks can have a priority of 1, 2, or 3, with 1 being the highest and 3 the lowest. The priority number appears next to the task.

- (1) Create or edit a To Do task.
- (2) Select a priority of 1, 2, or 3.
- (3) Choose OK.

NB: You can also display your prioritized tasks by indenting them. Choose Options/To Do and select "Show priority/As indent."

MARKING A TASK COMPLETED

Your To Do list can be a valuable source of information even after you've completed a task. If you mark a task completed, it appears with a line through it at the end of the To Do list for the day you completed it. If you don't mark a task completed, it carries forward to the next day's date, when it will be updated as either overdue or still current.

NB: If you display your To Do tasks, tasks not completed (current or overdue) will carry forward to the next day's date.

To mark a task completed

- (1) Click a To Do task you've completed
The Organizer displays the To Do dialog box.
- (2) Select "Completed" and choose OK

NB: To hide your completed tasks, choose Options/To Do and deselect "Show completed tasks."

Appendix D

Appendix D: Other Information
Thermo-X documents

Email

User Guide

NOTES

NB: At the time of writing, these instructions apply to the PC attached to the modem in the Spare Office.

Please follow these instructions closely.

Due to the nature of electronic mail, a wide range of different software packages are necessary for sending and receiving email messages: Microsoft Windows '95 (operating system), Dial-Up Software (modem software) and Eudora Light (email software).

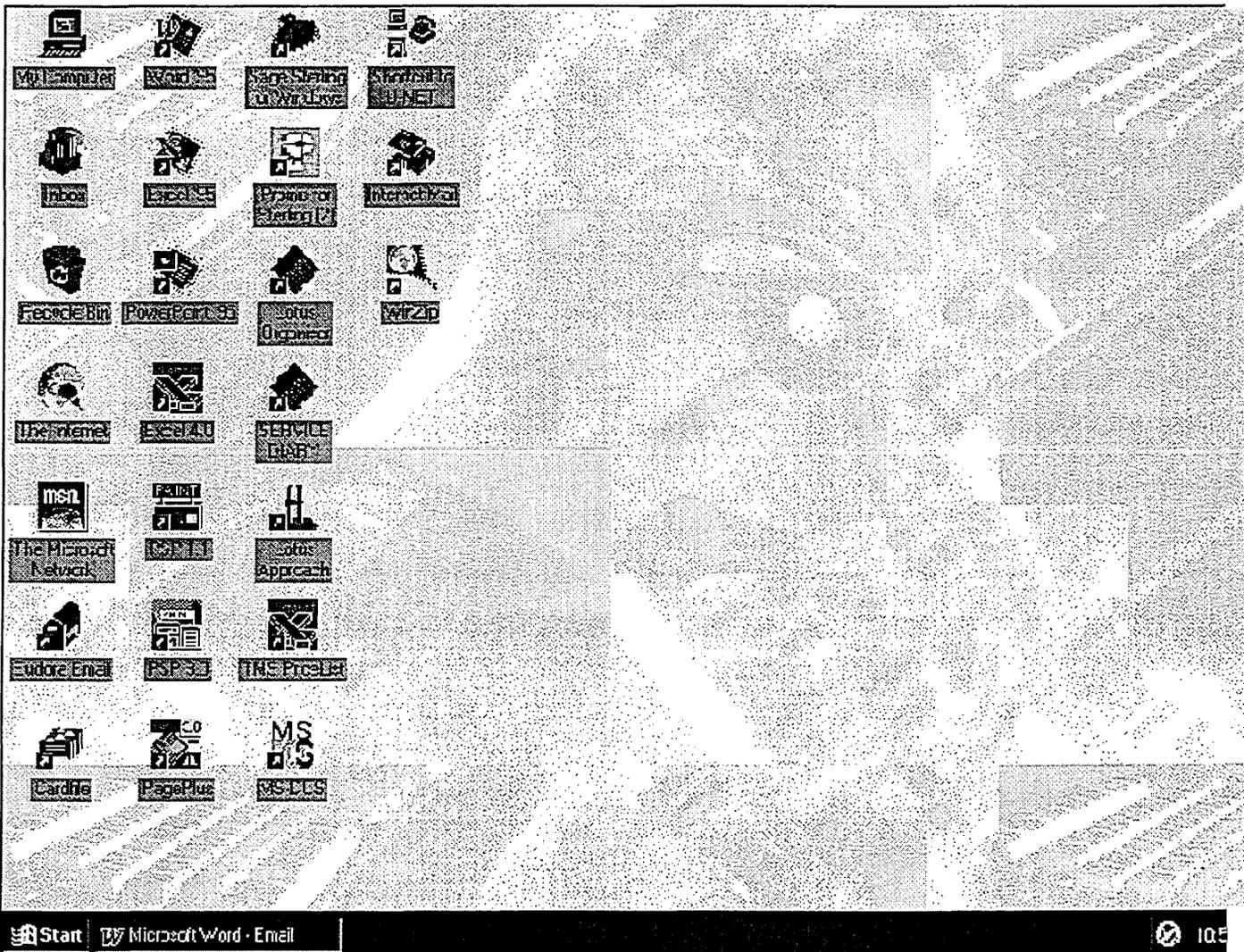
Only authorised users are allowed to operate the email facility for work use only.

Before Starting...

- (1) Make sure the following plugs are connected and switched on: **PC, Modem and Laser**
- (2) Power on these three devices (if not already done via the on/off power switch)

Windows '95 (operating system)

- (1) After switching on, wait a short time while the PC loads Windows '95
- (2) You should now be faced with a screen displaying several icons (see below)



Dial-Up Software [Modem software]

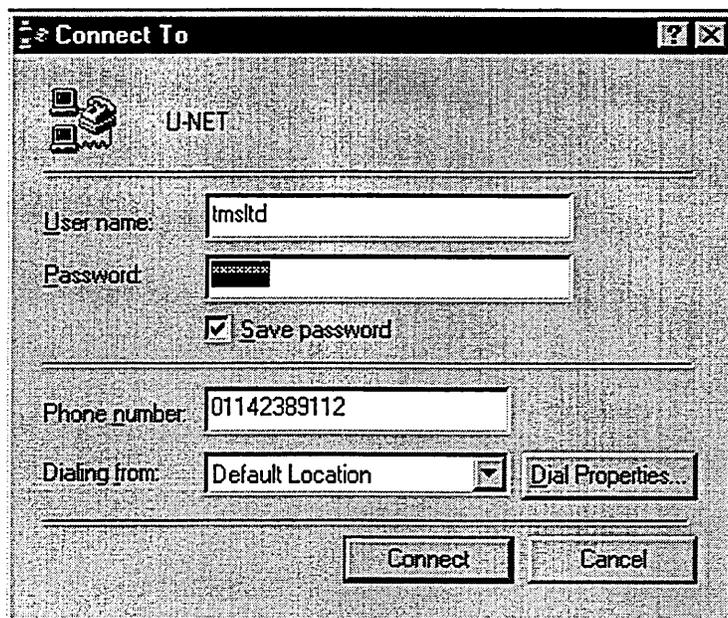
Make sure the modem is on and the TST, HS and MR lights are on. (if not, check the power connections at the rear of the modem and check that the Modem plug is in and switched on).

- (4) Locate the icon **Dial U-NET**:



and double-click on it to start the connection process.

- (5) The following screen will appear:



If no password is displayed, type **email1** in the password box and click on "*Connect*".

(6) The following box will appear:



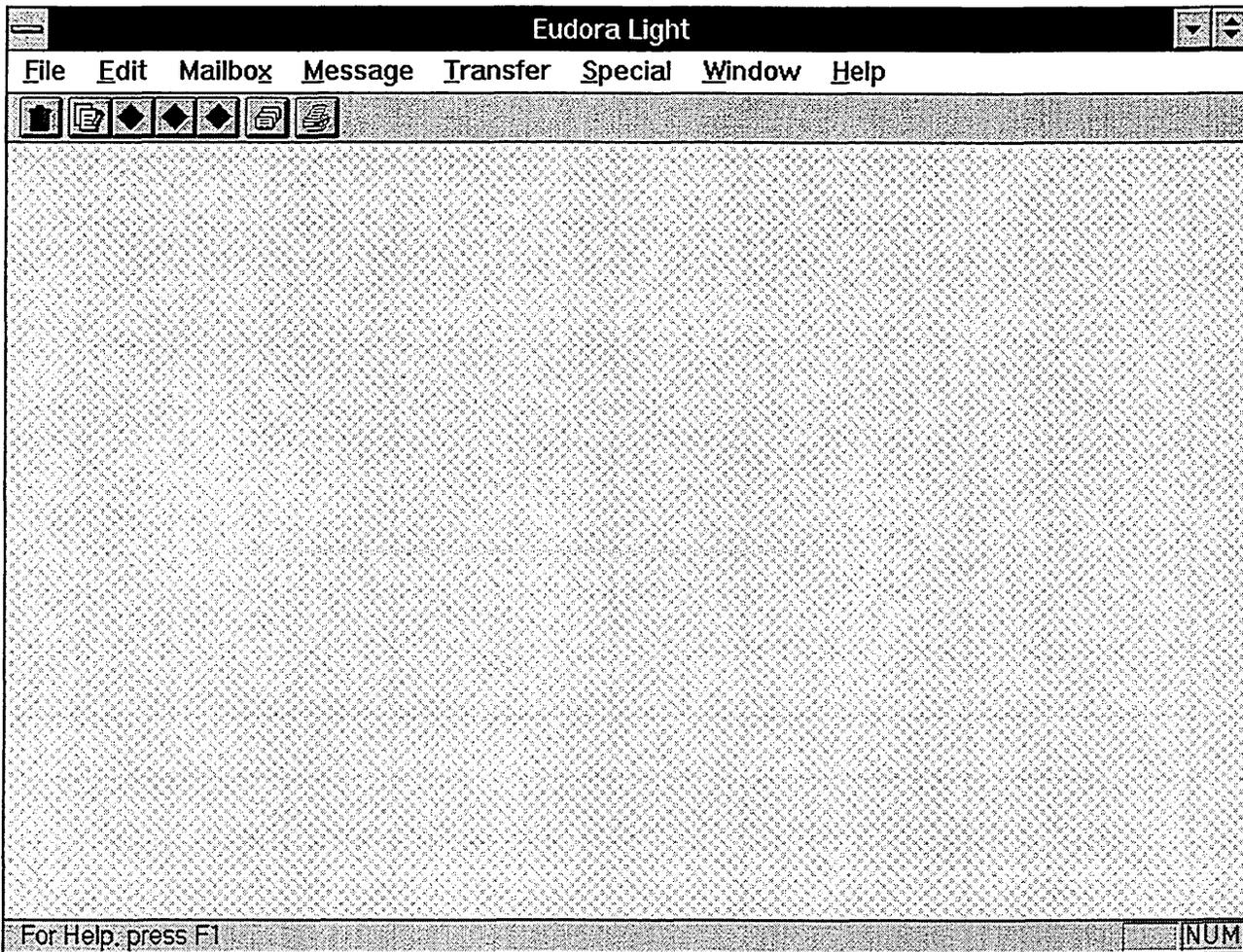
the status of which will change according to the modem's progress in connecting to the email server.

(7) Whilst the modem is connecting, locate the Eudora E-Mail icon and double-click on it:



Eudora Light [email software]

(8) After a few seconds, the following screen will be displayed:



Checking for emails

- (1) Click on **File** (to display a drop-down menu) and then click on **Check Mail**. This will log onto the Mail Server and will automatically check for any mail messages that have been left. Additionally, any mail messages that have been queued (see later section), will be sent at this stage.

NOTE *At this stage, in order to save on unnecessary telephone charges, return to the Dial U-NET screen and click on Disconnect*

- (2) Messages will be listed in order of receipt and can be viewed by double-clicking on the desired message. If needed, click on **Mailbox** and then **In** to display a list of all current messages.
- (3) If a print is required, click on **File** and then **Print**.

Sending emails

NOTE: *Try and compose your message(s) while "off-line" (ie. not connected via Dial U-NET) as you could be on for several minutes whilst typing your message out - all the while being charged for telephone calls)*

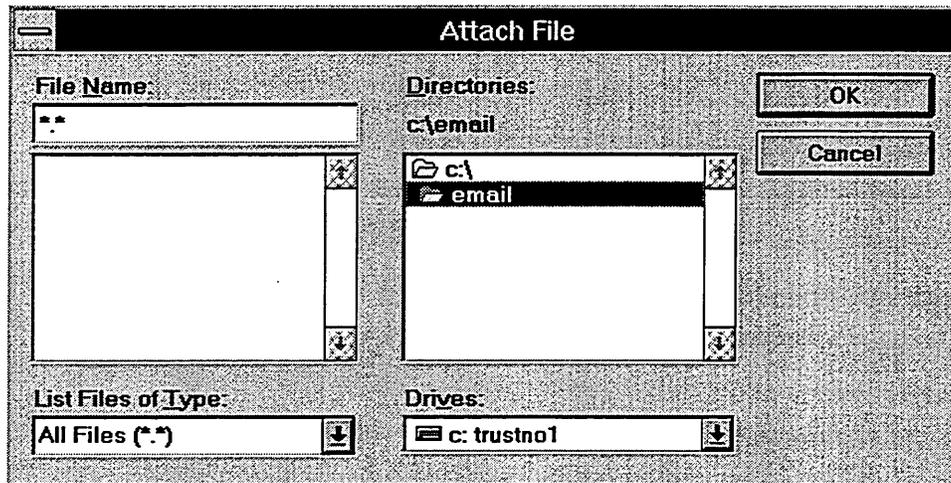
- (1) Select **Message** and then **New Message**
Using the mouse where necessary:
- (2) In the **To:** field type in the email address of the person you want to send the message to, for example:
jmmoore@testrep.com
- (3) The **From:** field is filled in automatically.
- (4) For reference purposes, put something suitable in the **Re:** section
- (5) Type your message in the main body of the email structure.
- (6) Periodically, save your message by clicking on **File** and then **Save**
- (7) When you have finished, click on **Queue**. Then, click on **File** and then click on **Send Queued Message**.
- (8) Log on to the network, (or if you are in no hurry, wait until you next do) and the queued messages are automatically sent.

Sending attachments

This allows you to send files that have been created using different application packages (eg. Word, Excel).

This section assumes that the user has created and saved their file(s) using the packages and have either saved or copied (after virus-checking all external floppy discs) to the directory C:\EMAIL

- (1) After writing a brief message in the main body of the email, click on **Message** and then **Attach File**
- (2) Use the mouse (double-clicking where necessary) to select the **EMAIL** directory (so that it displays all files in the **C:\EMAIL** directory as can be seen in the following picture:



- (2) Highlight your appropriate file and click on **OK**
- (3) When you have finished, click on **Queue**. Then, click on **File** and then click on **Send Queued Message**.
- (4) Log on to the network, (or if you are in no hurry, wait until you next do) and the queued messages are automatically sent.

Closing down

- (1) Make sure that you have exited from **Eudora Light** (clicking on **File** and then **Exit**)
- (2) Make sure that you have exited from **Dial U-NET** (using the method already described)

Lotus Organizer

User Guide

Lotus
Organizer
User Guide

Use of the Diary

The diary will be used primarily in two places: **Service** (where engineer call-outs and contracts can be stored, shared between two users) and **Accounts** (where dates for tax and reminders can be stored). There is no diary link between these two departments and this Guide is therefore applicable to both departments.

The Diary can be used to:

- Create and manage appointments
- Move appointments and meetings to a different day
- Create repeating appointments
- Schedule and change meetings
- Find and view free time for a meeting
- Set alarms to remind you of upcoming appointments and meetings
- Make appointments and meetings confidential
- Show information from other sections in the Diary

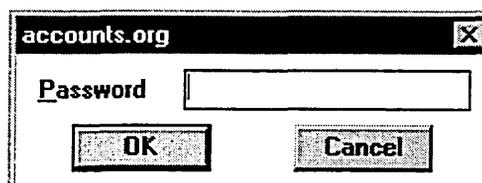
Starting the Diary

- (1) After switching on the computer and allowing it to boot up, (and if Windows does not automatically start), type **win** at the DOS prompt.
- (2) After a short while, you will be faced with a screen displaying several icons. (If not, double-click on the Program Manager icon to bring up the Program Manager window).
- (3) Locate the **Lotus Organizer** icon:



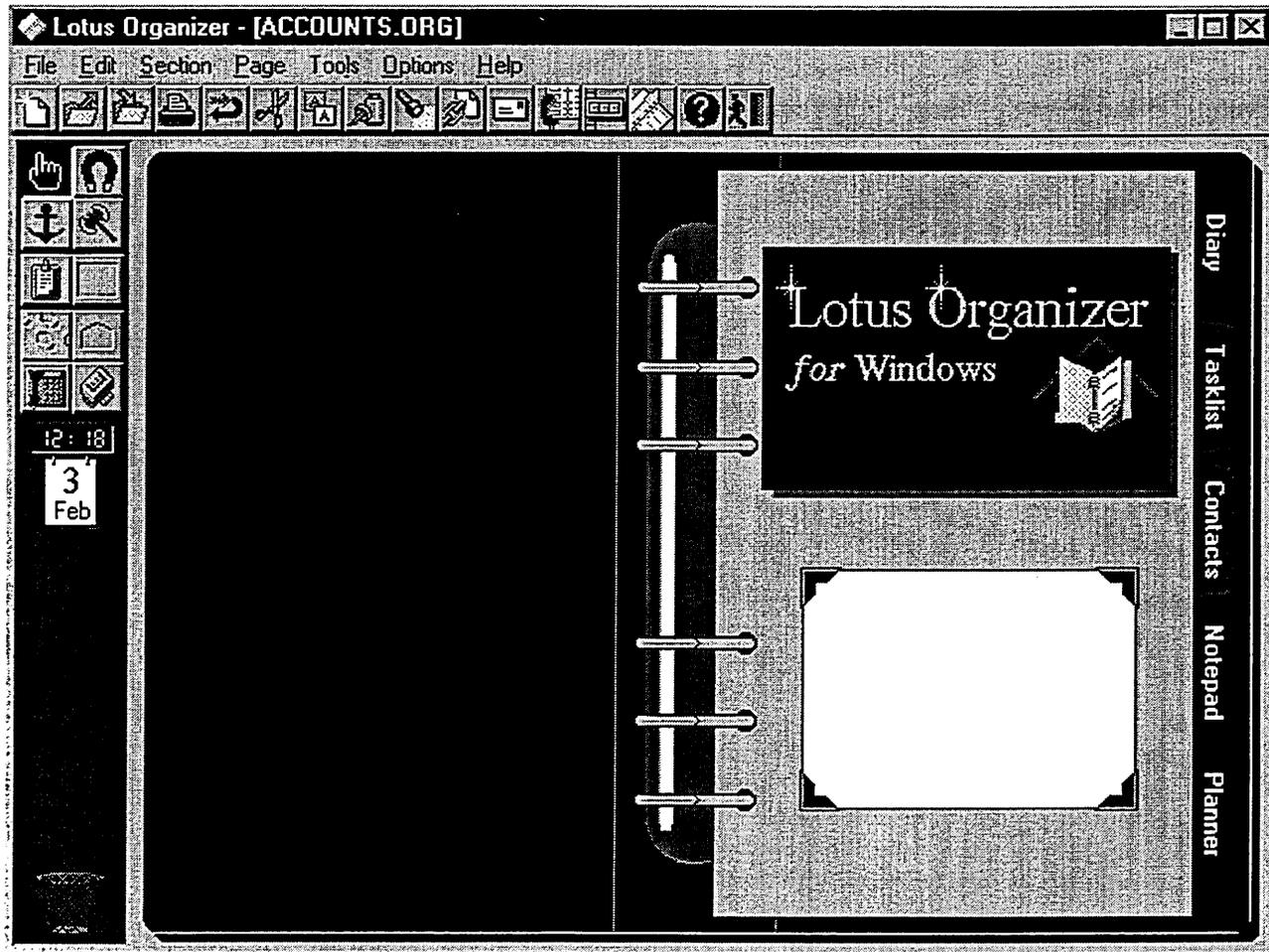
and double-click on it to start the program.

- (4) After a few seconds, the Lotus Organizer screen will appear and will give way to a box asking you to type in a password:



The above example shows a filename of "ACCOUNTS.ORG" but will show SERVICE.ORG if you are in the Service department.

- (5) After you have typed in the password, click on OK to enter the Diary.
- (6) The following screen will appear:



Diary Sections

The Diary is split into the following sections:

- Diary
- Tasklist
- Contacts
- Notepad
- Planner
- Anniversary/Birthday

You can remove any of these sections if you feel that you will have no use for them.

The layout of the Diary resembles a filofax and, to move to a particular section of the Diary, click on the appropriate tab at the right end side of the "filofax".

Selecting a Date

To open the Diary and select a date:

- (1) Click the Diary section tab.

The first page displays a diary for the current year. Today's date is outlined in red.

NB: To display the diary for a different year, click the year tabs to the left or right of the yearly diary.

- (2) Click the date you want to turn to.
Another way to open the Diary section to today's date is to click on today's date (left of screen)

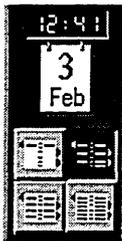
- (3) The Diary opens to the selected date.

NB: Make sure that your computer's time and date are set correctly. You can do this by selecting the Date/Time icon in the Windows Control Panel, or by using the DOS TIME and DATE commands.

Changing Diary Views

To change Diary views:

When your Diary is open to an appointment page, you can choose the view you want by clicking the view icon below the Toolbox (left of screen, underneath the clock and date):



You can choose whether to display the diary in the following forms (according to which of the four buttons you press):

- One day per page
- One work week per two pages
- One full week per two pages
- One full week per page

Creating an Appointment

In the Diary section you can:

- Create appointments

- Delete appointments
- Edit appointments

When you create an appointment in the Organizer, you just click the day and time and type the text.

TO CREATE AN APPOINTMENT

- (1) Click the day for the appointment
The Organizer displays all the time slots for that day. Use the scroll bar to move up and down the list.
- (2) Click the time you want the appointment to start
The appointment window and icons appear. The TimeTracker appears in the center of the binder.
- (3) Type the text for your appointment
- (4) Click to confirm or to cancel

The appointment appears in the Diary. Appointments are 60 minutes long unless you change their duration. For information, see *Setting Duration Using the Time Tracker*.

TO DELETE AN APPOINTMENT

You can easily remove a canceled appointment from your Diary.

Drag the appointment to the Trash bin (bottom left of screen) and drop it in.

NB: Once you delete an appointment you can retrieve it by choosing Edit/Undo before you delete something else.

TO EDIT AN APPOINTMENT'S TEXT

- (1) Click the appointment text
The Organizer displays the appointment window.
- (2) Make your changes and click when you're done

Showing Information from Other Sections

In your Diary, you can display entries from the To Do, Planner, and Anniversary sections to give you a view of all your daily commitments.

Information displayed from another section appears at the top of a day in your Diary, above any appointments (or meetings).

SHOWING TO DO TASKS IN THE DIARY

If you want to see everything that you have to do on a particular day, you can have your To Do tasks displayed in your Diary section. These To Do tasks appear at the top of their appropriate days, as specified by the start date.

To show To Do tasks in the Diary

- (1) Choose Options/Diary.
The Organizer displays the Diary Options dialog box.
 - (2) Choose Show.
The Organizer displays the Diary Options (Show) dialog box.
 - (3) Select the To Do section from the Show entries from list.
- NB:** You can deselect a section name by clicking it again.
- NB:** If you want to see all the tasks from all your To Do sections, be sure to select all To Do sections.
- (4) Choose OK twice.

Your To Do tasks from the section you selected are now displayed in the Diary section. Any current or overdue tasks are displayed at the top of today's date in the Diary.

Working with tasks in the Diary

You can edit any To Do task that shows in the Diary section. Just click the task, and the To Do dialog box appears.

You can also reschedule To Do tasks within the Diary. Just drag and drop a task to a different day. The start and due dates automatically change to the new day. In the Diary, you can also use the magnet in the Toolbox to move tasks to a day not on the screen.

NB: To see which tasks are completed each day, choose Options/To Do and select "Show completed tasks."

Keeping track of Anniversaries

You can use the Anniversary section to keep a list of all the important dates that you need to remember every year. You can enter as many anniversaries as you like. After you've entered a date in the Anniversary section, that date will automatically carry forward into future years.

Using the Anniversary section, you can:

Enter anniversaries
Edit the text of an anniversary or change its date

ENTERING AN ANNIVERSARY

You can easily enter or delete anniversaries.

To enter an anniversary

- (1) Click the Anniversary section tab.
The Organizer displays the first page of the Anniversary section.
- (2) Click in the Toolbox.
The Organizer displays the Anniversary dialog box.
- (3) Specify the date for the anniversary.
You can type the date, or use the down arrow next to the date and select a date from the pop-up diary.
- (4) Type the description for the anniversary.
- (5) Choose OK.

Your anniversaries automatically appear in your Diary section, above the appointments for each day. If you don't want your anniversaries to appear, choose Options/Diary and then choose Show. Deselect "Anniversary" and choose OK twice.

TO DELETE AN ANNIVERSARY

Drag and drop the anniversary into the Trash Bin.

EDITING AN ANNIVERSARY

To edit the text of an anniversary or change its date:

- (1) In the Anniversary section, click the anniversary text.
The Organizer displays the Anniversary dialog box.
 - (2) Change the date or the description of the anniversary.
 - (3) Choose OK.
- NB:** You can change the color of your anniversaries by choosing Options/Anniversary.

Printing from sections

You have a variety of information you can print from the Organizer. This topic contains tips for printing entries from each section, such as one day of Diary appointments, a formatted name and address list, or a specific set of To Do tasks.

To print from any of the Organizer's sections:

- (1) Choose File/Print
- (2) Select the Section from which you want to print.
- (3) Select the Paper type.
- (4) Select the appropriate options for the specific section, as described below.
- (5) Choose OK.

TO PRINT ONE DAY FROM THE DIARY SECTION:

Choose Options/Diary and then choose View. Change the Diary view to "Day per page." Drag and drop the appointment over the Printer icon in the Toolbox. Select the appropriate Paper layout.

TO PRINT MORE THAN ONE DAY FROM THE DIARY SECTION

Choose File/Print and type the dates you want in Range From and Range To. Select the appropriate Paper layout.

TO PRINT TO DO TASKS

To print all pages in the To Do section, do one of the following:

Choose File/Print and select "On screen" for Format output as. Then select "All." Click the printer icon , then for Range select "All."

TO PRINT A SPECIFIC SET OF TO DO TASKS

Choose File/Print and select "All entries" for Format output as. Type the appropriate dates for Range From and Range To.

TO PRINT NOTEPAD PAGES

Choose File/Print and select "On screen" for Format output as. Type the page number for Range From and Range To. Drag and drop the page on in the Toolbox.

TO PRINT MORE THAN ONE PAGE

Choose File/Print and specify the page numbers for Range From and Range To.

TO PRINT ALL PAGES

Choose File/Print and specify "All" for Range.

TO PRINT ANNIVERSARIES

Choose File/Print and select "All entries" for Format output as. Type the first date you want to print for Range From and the last date you want to print for Range To.

Customising your Diary

You can change the color of your Organizer binder as well as specify the display of certain options.

NB: You can customize your notebook cover by typing text in the area at the bottom of the front cover. For example, you can type in the department name.

TO SET PREFERENCES

- (1) Choose Options/Preferences.
The Organizer displays the Preferences dialog box.
- (2) Select the appropriate display options and choose OK:

Clock & today's date

Displays the clock and date diary under the Toolbox.

Animated page turn

Simulates a turning page

Monochrome

Optimizes the display for a monochrome system

Gray dialog boxes

Displays all dialog boxes with a gray background

TO CHANGE THE BINDER COLOR

- (1) Choose Options/Display.
- (2) Select the book cover color you want and choose OK.

*For more information, see Customizing Section Tabs in the on-line Help
(press F1 and Search)*

Using the Organizer Utilities

A Lotus Organizer (.ORG) file can become damaged if another program changes that file accidentally, or if the computer experiences a power loss or surge that

destroys information on the hard disk or in memory. You can use the Organizer Utilities to help fix any problems with the integrity of your file.

You should suspect that your Organizer file may be damaged if you experience problems when you turn pages, add information, or try to save or open the file. Your file may be damaged if you get unexpected Windows General Protection Faults or UAEs (Unrecoverable Application Errors).

In addition, the Organizer Utilities can compact your Organizer file into its smallest possible size. This is useful if you continually add and delete large pieces of information, such as pictures in your Notepad.

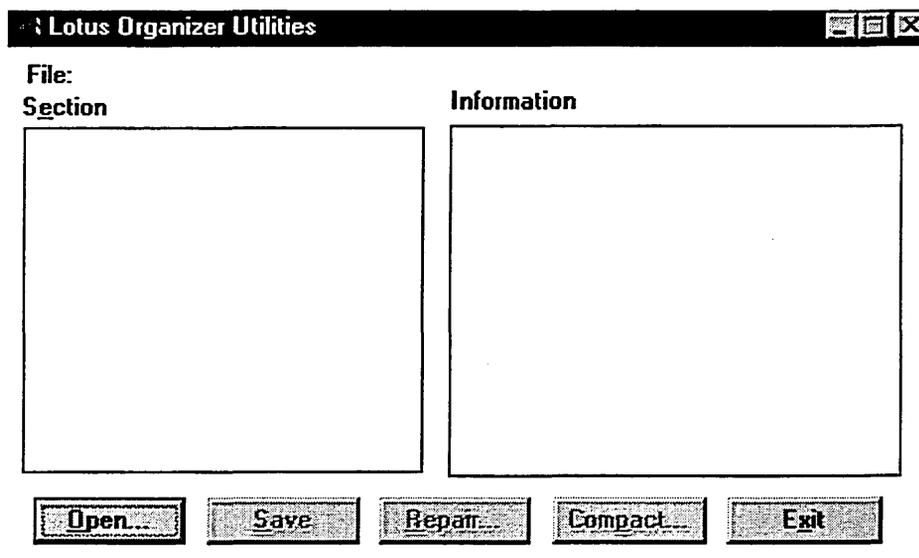
Run the Organizer Utilities occasionally to simply verify the integrity of your file.

TO RUN THE ORGANIZER UTILITIES

- (1) Choose File/Close to close the current Organizer file.
- (2) Return to Windows Program Manager and find the Organiser Utilities icon and double-click on it:



- (3) After a few seconds, the following screen will appear:



- (4) Choose Open.
- (5) Select the file to verify and choose OK (select your chosen file here, eg. ACCOUNTS.ORG)
A status box indicates progress as the file is checked.
- (6) If an error is detected, you are prompted to repair the file. Choose Yes or No.

If you choose **Yes**, a status box indicates progress as the file is repaired.
If you choose **No**, you can select a section from the Section list to see more information. You can then choose Repair to repair the file.

NB: Whenever the Organizer Utilities repair a file, the program makes a back-up copy in a file of the same name with the extension .OLD. For example, ACCOUNTS.ORG would be copied to ACCOUNTS.OLD

(7) If no errors are detected, choose OK to continue.

(8) If the file needs compacting, the Organizer Utilities prompt you to compact the file. Choose Yes or No.

If you choose **Yes**, a status box indicates progress as the file is compacted.
If you choose **No**, you can still choose to compact the file by choosing Compact from the Organizer Utilities window.

NB: Whenever the Organizer Utilities compact a file, the program makes a back-up copy of the original in a file of the same name with an extension of .OLD. For example, ACCOUNTS.ORG would be copied to ACCOUNTS.OLD

(9) If you repaired or compacted your file, choose Save to save it.

(10) Choose Close to close the file.

NB: If you haven't saved the file, you are prompted to do so.

(11) Choose Exit to exit the Organizer Utilities.

NB: If a file is badly damaged, the Organizer Utilities attempt to export the damaged information to an ASCII (CSV) format file. The remaining information in the file is repaired but will exclude any of the exported damaged information.

The exported information from the damaged file is written to files named <section type>.CSV. For example, damaged address records would be written to ADDRESS.CSV in the directory where the file was originally opened. You can examine these files using Windows Notepad or Windows Write, and you can attempt to reenter the information or import it back into your Organizer file.

TETRA short instructions

Function	Department
How to raise a Purchase Order Deleting an Existing Purchase Order Printing an Existing Purchase Order Amending an Existing Purchase Order	Purchasing
Receiving Goods (from a supplier) Receiving Goods (finished goods)	Despatch
How to allocate stock	Stores
How to check stock	All departments

How to raise a Purchase Order

Once in TETRA, select:

- the **Purchase Orders** option from the **Purchases** drop-down menu
- then select **Daily Activities Menu** and then select
- **Order Entry**

- (1) Generate the next order number by pressing **F6**
These Purchase Order numbers must be synchronised with those in the Purchase Order book
- (2) Move down with the arrow keys and then change **Date of Order** if required
- (3) Move down with the arrow keys and then change **Date Required** if required
- (4) Press **F2** to browse down the supplier list, using the **F3** and **F6** keys to move up and down the list one "page" at a time until you see your desired supplier

Move to the supplier name using the arrow keys until it is highlighted and then press **F9** to confirm

If your desired supplier does not show, check that the supplier name is correct. If it is, it may be a new supplier and will need entering into the system via the Accounts department

- (5) Full Supplier details appear on the top-right of the screen.

Use the arrow keys to get down to the **Reference** box.

- (6) Type in the initials of the originator of the Purchase Order (eg. DLF, BH, CH etc)
- (7) Press **F9** to confirm
- (8) Cursor moves to the top-right of the screen (supplier details). Check, and amend if necessary, the details.

Press **F9**

- (9) Cursor will move down to the detail lines of the Purchase Order and will rest on the **Warehouse** field)
- (10) Use the arrow keys to move across the to the **product** field.

- (11) Press **F2** to bring up the **browse options**
- (12) Press **F3** to bring up the **browse stock list**
- (13) Use the **F3** and **F6** keys to move up and down the list one "page" at a time until you see your desired stock item.

Move to the stock item required using the arrow keys until it is highlighted and then press **F9** to confirm

- (14) Cursor will move to **quantity**. Fill in the **quantity** required and then press **F9**
- (15) Cursor will move to **date required**. Fill in the **date required** and then press **F9**
- (16) Cursor will move to **price**. Fill in the **price** agreed and then press **F9**
- (17) Press the **<ENTER>** key
- (18) Cursor will move to **discount**. Fill in the **discount** agreed and then press **F9**
- (19) Cursor will move down to the next line
- (20) **Repeat steps 10 - 19 above as necessary until all of the goods required for this Purchase Order have been entered,**
- (21) When you have entered in all of your items, press **F1**
- (22) Press **F9**
- (23) To print out the Purchase Order, press **F10** to bring up the print menu
- (24) Press **F9** to print
- (25) Press **F9** again
- (26) Enter in more Purchase Orders is required, if not (or when you have finished...
- (27) ...press **F1** to exit back to the menu

Deleting an existing Purchase Order

To select an existing Purchase Order for deletion:

- the **Purchase Orders** option from the Purchases drop-down menu
- then select **Daily Activities Menu** and then select
- **Order Entry**

(1) Enter the known Purchase Order number and press **F9**

(2) Press **F5**

(3) Type **DELETE** and then press **F5** again

Amending an existing Purchase Order

To amend an existing Purchase Order:

- the **Purchase Orders** option from the Purchases drop-down menu
- then select **Daily Activities Menu** and then select
- **Order Entry**

- (1) Enter the known Purchase Order number and press **F9**
- (2) Amend the header information (if necessary) and then press **F9** until the cursor rests on the first detail line. If no detail lines need to be amended, press **F1** to move on to the completion stage
- (3) To amend, add or delete detail lines, press **F9** through the header information until the cursor points to the first detail line.

Press **F7** to move the cursor down a line, leaving the data on the current line unchanged

Press **F6** to add a new line to the order and to skip directly onto the top of the next page

Press **F3** to go back to the first line of the order

To delete a line from the order, press **F5** at the warehouse/product code stage. A space will be left on the screen which can be removed by pressing **F3** to go back to the top of the order detail lines.

- (4) When amendment is complete, press **F1** at the start of any detail line to move on to order completion.

Receiving goods (from a supplier)

Once in TETRA, select:

- the **Purchase Order** option from the **Purchases** drop-down menu
- then select **Daily Activities Menu** and then select
- **Receipts Entry**

- (1) Generate the next transaction number by pressing **F6**. The program will automatically add the prefix **G** and date if necessary and then
- (2) Arrow down to **Supplier Number**
- (3) The following field will be displayed:

Supplier Enter the supplier number for this receipt
Press F2 to Browse through the list of available suppliers to select and then press F9 to confirm

Receipt Date The current date is displayed by default. You can change this to another date if you need to and then use the arrow keys to move down to

Comments Enter in **Checked by...** here

- (4) Check your details so far and then press **F9**
- (5) Enter a Purchase Order number
- (6) You can then process by **marking an entire order as received or handling on a line-to-line basis** (see below):

Receive full quantity

Use this option if all goods have been received in the quantities required and at the costs expected.

- (i) Having entered the Purchase Order number (stage 6 above), press **F4**. This will update the purchase order as being fully received.
- (ii) When processing is complete, the program will request the next order number

Receive part quantity

Use this option if only part of the order needs processing.

- (i) Having entered the Purchase Order number (stage 6 above), press **F9**

or

Leave the purchase order number field blank and press **F9** to view the next purchase order which is on file for the supplier selected and which still has items outstanding for receipt

- (ii) Detail lines are displayed in "pages" of 10 lines.

If this order does not contain the correct products (may occur if you use option (ii) above, press **F1** to clear the order (which will leave it unchanged) and press **F9** again to find the next order.

- (7) When checking individual detail lines, use the **ENTER** key together with **F6** (to move on to the next page of the detail lines) and **F3** (to go back to the first page of detail lines)
- (8) Validate and accept the current line and move down to the next one by pressing **F9**.
- (9) On each line, enter or amend the following fields and accept the information by pressing **F9**:

Quantity Received	Enter a numeric value
Price	Amend the price if it has altered since the order
More?	y if quantity received is less than the outstanding figure n if all the goods have been received

- (10) Continue until all the goods received on this transaction have been recorded.
- (11) Then at the start of the next order line, press **F1** when the program will prompt for the next purchase order number

Receiving Goods (finished goods)

Stock Enquiry

N.B.: This option is available from more than one "drop-down" menu. The example given uses the **Stock** drop-down menu

Once in TETRA, select:

- the **Stock Control** option from the **Stock** drop-down menu
- then select **Daily Activities Menu** and then select
- **Stock Enquiry**

- (1) Type **CA** in the warehouse field and then move across to the **product** field.
- (2) Either type in the product code (if you know it) or press **F2** to browse the stock. Pressing **F6** moves down the stock list one "page" at a time. (**F7** will move back a page at a time)
- (3) Once you have highlighted the product you want to enquire on, press **F9** to select it.
- (4) The screen will display details on the product (description, cost etc)
- (5) Pressing **F6** will display **stock levels** for the product.
- (6) Press **F1** once you have finished.

Stock History Enquiry

Once in TETRA, select:

- the **Stock Control** option from the **Stock** drop-down menu
- then select **Daily Activities Menu** and then select
- **Stock History Enquiry**

(1) Type **CA** in the warehouse field

(2) Cursor will move to the **product field**

(2) Either type in the product code (if you know it) or press **F2** to browse the stock. Pressing **F6** moves down the stock list one "page" at a time (**F7** will move back a page at a time)

(3) Once you have highlighted the product you want to enquire on, press **F9** to select it.

(4) The screen will display stock history details on the product

eg. *Type* field will display type of transaction (eg: goods received note, receipts, issues, adjustments)

Comments field will display details of the **Purchase Order** number (or the Works Order number)

(5) When you have finished viewing details, press **F1** twice to return to the main menu.

Adjusting Stock levels

Once in TETRA, select:

- the **Stock Control** option from the **Stock** drop-down menu
- then select **Daily Activities Menu** and then select
- **Adjustments**

- (1) Press **F6** to generate next transaction number
- (2) Using the arrow keys, move down and adjust the **date** field if necessary.
- (3) Move down with the arrow keys and add **Comment** if required (eg. why stock is being adjusted)
- (4) Move down with the arrow keys to the **product** field
- (5) Press **F2** to browse down the products, using the **F3** and **F6** keys to move up and down the list one "page" at a time until you see your desired product
- (6) Highlight your product and then press **F9**
- (7) Using the arrow keys, move down to the **quantity** field and enter in your desired quantity
- (8) Using the arrow keys, move across to the **cost** field and enter in the cost
- (9) Press **F9**
- (10) Check the details and if they are correct, press **F9** to confirm, otherwise press **F1** to re-enter

Issuing Stock

Once in TETRA, select:

- the **Stock Control** option from the **Stock** drop-down menu
- then select **Daily Activities Menu** and then select
- **Issues**

- (1) Press **F6** to generate next transaction number
- (2) Using the arrow keys, move down and adjust the **date** field if necessary.
- (3) Move down with the arrow keys and type, in the **Comments** field the **Works Order** number (Note: TETRA does not have a special field for Works Order number, so we will be substituting the comments field for the TMS Works Order number)
- (4) Move down with the arrow keys to the **product** field
- (5) Press **F2** to browse down the products, using the **F3** and **F6** keys to move up and down the list one "page" at a time until you see your desired product
- (6) Highlight your product and then press **F9**
- (7) Using the arrow keys, move down to the **quantity** field and enter in your desired quantity
- (8) Press **F7** if you want to check the location code
- (9) Press **F9**
- (10) Check the details and if they are correct, press **F9** to confirm, otherwise press **F1** to re-enter

Stock Master - Entering a New Item

- (1) From the Main Tetra Menu, select the "Stock" option
- (2) Select "Stock Control" option
- (3) Select "Housekeeping"
- (4) Select "Stock Entry"

- (5) The screen will change to display the Main Stock Entry screen

The **Warehouse** location will default to **CA** for Castleton.

Move the cursor, using the arrowkeys, to the **Product** field and enter your product.

- (6) The first three (3) characters are taken up by an abbreviated form of the main product (eg. APS for AP Sheath, APT for AP Tube etc).

The next 5 characters are taken up by the inside diameter, "justified to the right", the remainder taken up by spaces. For example, if the **inside diameter** is 7mm, you would type in:

<Space> <Space> <Space> <Space> 7

and for an inside diameter of 12, you would type:

<Space> <Space> <Space> 12

- (7) Repeat this for the **outside diameter** and for the **length**.

Therefore, the full format for an AP Sheath, measuring 7x12x760m, the TETRA code would be:

A	P	S				7	X				1	2	X			7	6	0
---	---	---	--	--	--	---	---	--	--	--	---	---	---	--	--	---	---	---

and an AP Sheath, measuring 12x15x1000, the code would be:

A	P	S				1	2	X				1	5	X		1	0	0	0
---	---	---	--	--	--	---	---	---	--	--	--	---	---	---	--	---	---	---	---

Stock Code	Description	Qty
		0.00
19358A	TYPE K THERMOCOUPLE	
19361A		
301PAR1	CHS 301 CHT MTR 60HZ	
301PAR10	SVC 300/301 GEARS G8	
301PAR11	SVC 300/301 GEARS G9	
301PAR12	SVC 300/301 GERS G10	

Criteria New OK Cancel

If your item is not on the list, and you are ordering for the **DIRECT** warehouse **ONLY**, carry out the following procedure. (if your product is for **CASTLETON** or for **EX-STOCK**, please ask the Storeman to create the code for you).

Product Record [X]

Details Memo

Product Code	<input type="text" value="New Product"/>	In Stock	<input type="text" value="0.00"/>
Description	<input type="text"/>	Allocated	<input type="text" value="0.00"/>
Department	<input type="text" value="0"/>	Free Stock	<input type="text" value="0.00"/>
Category	<input type="text" value="1 CA - Castleton Warehouse"/>	On Order	<input type="text" value="0.00"/>
Location	<input type="text"/>	Last Ord Qty	<input type="text" value="0.00"/>
Com. Code	<input type="text"/>	Weight	<input type="text" value="0.00"/>
Nominal Code	<input type="text" value="4000"/>	Tax Code	<input type="text" value="T1 17.50"/>
Supplier A/C	<input type="text"/>	Part No.	<input type="text"/>
Sales Price	<input type="text" value="0.00"/>	Unit of Sale	<input type="text"/>
<input type="checkbox"/> Ignore Stock Levels	Stock Take Date	<input type="text"/>	Re-order Level
			<input type="text" value="0.00"/>
			Re-order Qty
			<input type="text" value="0.00"/>
			Cost Price
			<input type="text" value="0.00"/>
			Stock Take Qty
			<input type="text" value="0.00"/>

Save Abandon Close

- (4) In the **Product Code** box, type the Purchase Order number to which the Product is linked (eg. if a C100 unit has been ordered for Purchase Order number 15652, you would enter 15652 in the box).

If there is more than one product item for the Order, end the Works Order number with an A, B, C, D etc: eg. 15652A, 15652B etc).

- (5) For Direct items (those items which are straight in and straight out), you would need to fill in the following boxes only: Description, Department (W,I,N,X,R or S) and the Category (which for Direct Items would be **2 - Direct Warehouse**).

Fields such as additional detail and cost can be entered on the Purchase Order form.

- (6) Click on the **Save** button
- (7) The Product Record screen will close and Sage will return you to the **Purchase Order** screen. The new product you have entered will be highlighted. Click on **OK** to accept this item.

Stock Code	Description	Qty
APS61	APS 8 12 915	
RAJ1		<input checked="" type="checkbox"/>
		Totals

- (8) The cursor will move to the **Description** field. Click on the **Pen** button to bring up the following box:

Product Item Line

Product Details

Product Code: RAJ1

Description:

Comment 1:

Comment 2:

Product Line Details

Quantity: 1.00

Unit Price: 0.00

Net: 0.00

VAT: 0.00

To Deliver: 1.00

Discount %: 0.00

Discount: 0.00

Tax Code: T1 17.50

Delivered: 0.00

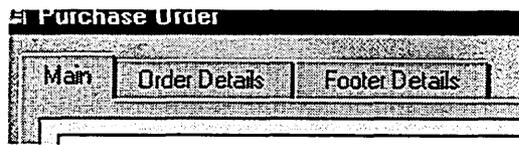
Buttons: Calc. Net, OK, Cancel

Fill in the **Description** field and add additional details in the **Comment 1** and **Comment 2** fields.

- (9) Enter the quantity required in the **Quantity** field.
- (10) Click on **Unit Price** to enter a price per unit for the item required.
- (11) If a discount is to be given, fill this in either in the **Discount %** field (if a percentage amount has been quoted) **OR** in the **Discount** field if a monetary value has been given).
- (12) Once you are happy with these details, click on **OK**. Sage returns you to the Purchase Order window.

If you need to, enter more items in the same way.

- (13) There are three "tabbed" boxes at the top of the Purchase Order window.



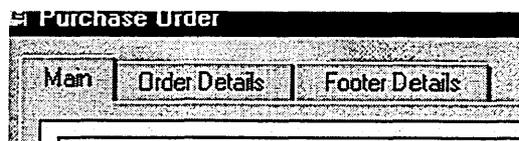
Click on the **Order Details** tab to bring up the following window:

A larger screenshot of the 'Purchase Order' window with the 'Order Details' tab selected. The window contains several sections:

- Delivery Address:** A large empty text area for entering the address.
- Notes:** A smaller empty text area for entering notes.
- Supplier Order Details:** A section with four input fields: 'Supplier Order No.' (empty), 'Supplier Tel No.' (01246 454077), 'Supplier Contact' (empty), and 'Order Taken By' (MANAGER).
- Order Status:** A section with three input fields: 'Order' (ON-ORDER), 'Deliver' (empty), and 'Due Delivery' (empty with a calendar icon).

At the bottom of the window, there are five buttons: 'Save', 'Abandon', 'Print', 'Complete', and 'Close'.

- (14) Enter in a **Delivery Address** if this is different from the Invoice address. This will appear on the printed Purchase Order.
- (15) Enter in details in the **Supplier Order Details** section.
- (16) **NB: It is important to enter a name or area in the "ORDER TAKEN BY" field.**
- (17) In the **Order Status** section, click on the **Due Delivery** "calendar" and double-click on the due delivery date for the item.
- (18) Click on the **Footer Details** tab at the top of the Purchase Order window.



(19) The following window is opened:

The screenshot shows a 'Purchase Order' window with three tabs: 'Main', 'Order Details', and 'Footer Details'. The 'Order Details' tab is active. It contains two main sections: 'Carriage' and 'Settlement Terms'.
The 'Carriage' section has the following fields:
- Net: 6.25
- VAT: 1.09
- N/C: (empty)
- T7c: T1 17.50
- Gross: 7.34
- Dept: 0
The 'Settlement Terms' section has the following fields:
- Days: 0
- Amount: 0.00
- Discount %: 0.00
- Total: 20.26
At the bottom of the window are five buttons: 'Save', 'Abandon', 'Print', 'Complete', and 'Close'.

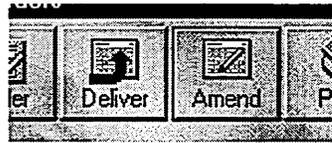
- (20) Check the carriage details are correct.
- (21) In the **N/C** field, type the number relating to Carriage for Nominal Ledger purposes. This Code will be given to you shortly.

It is important that this field be filled in. Please do not continue until you have filled this in.

- (22) The Purchase Order is now complete. If you want to enter another Purchase Order (and/or if you do not want to print the order yet), click on the **Save** button.
- (23) Repeat the Purchase Order process if necessary.

Sage: Receiving Goods

- (1) Click on the **POP** button.
- (2) Highlight the Purchase Order number and click on the **Amend** button.



- (3) A screen similar to this is brought up:

Amend Deliveries

ABB Kent Taylor (Stonehouse)
Oldends Lane
STONEHOUSE
Gloucester
GL10 3TA

Order No. 1
Date 06/05/1998
Order Value 244.64
A/C Ref ABB

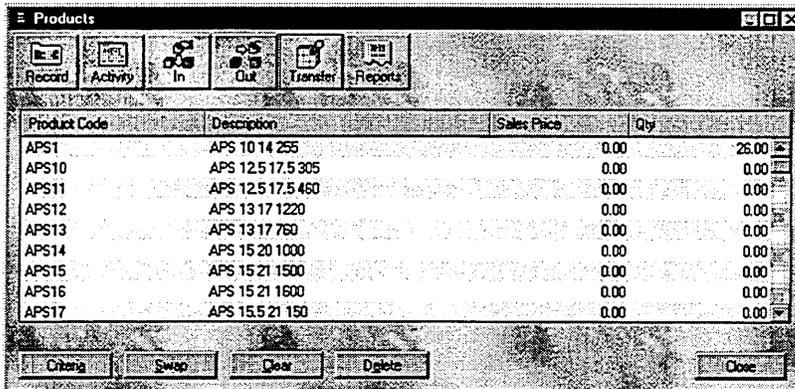
Product Code	Description	Ordered	Delivered	Outstanding	This Delivery
APS13	APS 13 17 760	15.00	15.00	0.00	0.00
APS2	APS 10 14 450	5.00	5.00	0.00	0.00
APS13	APS 13 17 760	1.00	1.00	0.00	0.00
APS10	APS 12.5 17.5 305	1.00	1.00	0.00	0.00
AFT28	APT 28 100 200	1.00	1.00	0.00	0.00

Order Deliver < > Close

- (4) Items on the Purchase Order are listed. Click on the **This Delivery** field for each item and enter in the quantity received.
- (5) After you have repeated this process for all items you want to book in, click on the **Deliver** button.

Sage: Issuing Stock

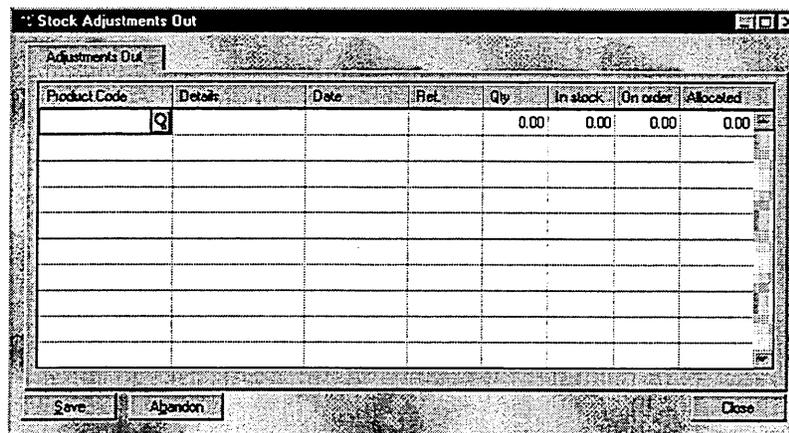
- (1) Click on the **Products** button. A window similar to this will appear:



Product Code	Description	Sales Price	Qty
APS1	APS 10 14 255	0.00	26.00
APS10	APS 12.5 17.5 305	0.00	0.00
APS11	APS 12.5 17.5 460	0.00	0.00
APS12	APS 13 17 1220	0.00	0.00
APS13	APS 13 17 760	0.00	0.00
APS14	APS 15 20 1000	0.00	0.00
APS15	APS 15 21 1500	0.00	0.00
APS16	APS 15 21 1600	0.00	0.00
APS17	APS 15.5 21 150	0.00	0.00

ISSUING STOCK

- (i) Click once on the **Out** button.

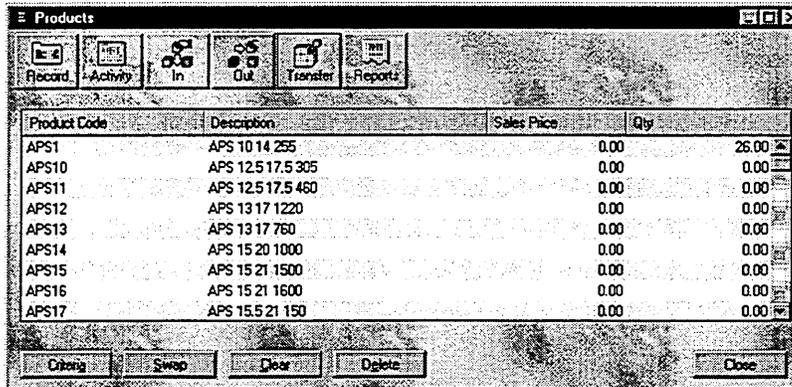


Product Code	Details	Date	Ref	Qty	In stock	On order	Allocated
				0.00	0.00	0.00	0.00

- (ii) In the **Product Code** field, either enter in the Product Code (if known) or click on the "Magnifying Glass" button to carry out a search.
- (iii) Check the **Date** is correct and enter a reference in the **Reference** field. This could be a works order etc.
- (iv) Move to the **Qty** field and enter in the quantity you want to issue. If there is insufficient stock in, Sage will tell you.
- (v) Enter in more items (if necessary) on each subsequent line.
- (vi) Once you are complete, click on **Save**.

Sage: Adjusting Stock In

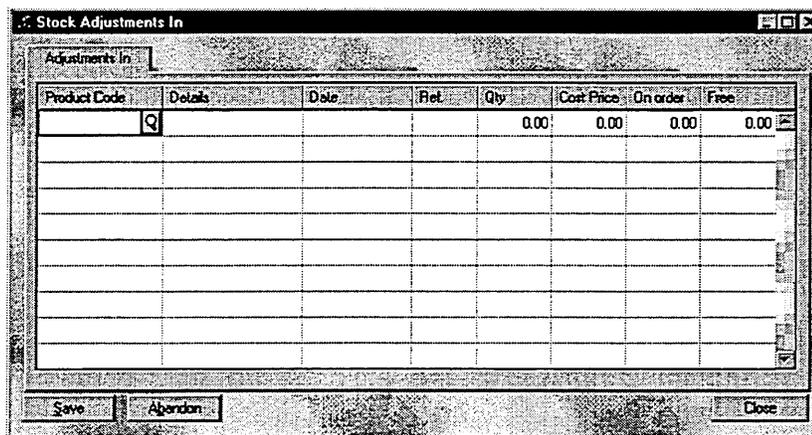
- (1) Click on the **Products** button. A window similar to this will appear:



Product Code	Description	Sales Price	Qty
APS1	APS 10 14 255	0.00	26.00
APS10	APS 12 5 17 5 305	0.00	0.00
APS11	APS 12 5 17 5 460	0.00	0.00
APS12	APS 13 17 1220	0.00	0.00
APS13	APS 13 17 760	0.00	0.00
APS14	APS 15 20 1000	0.00	0.00
APS15	APS 15 21 1500	0.00	0.00
APS16	APS 15 21 1600	0.00	0.00
APS17	APS 15 5 21 150	0.00	0.00

ADJUSTING STOCK IN

- (i) Click once on the **In** button.

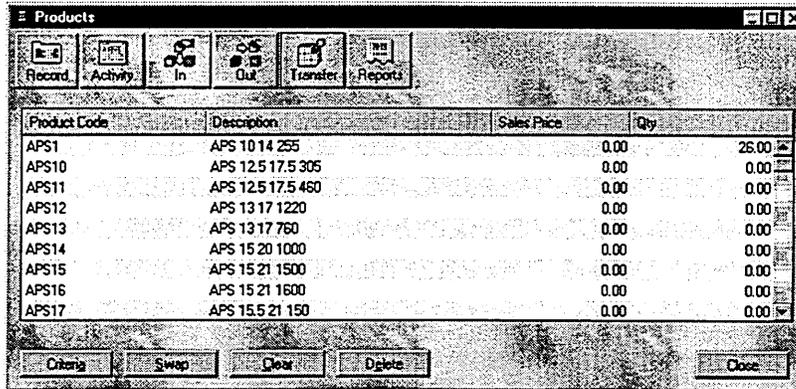


Product Code	Details	Date	Ref	Qty	Cost Price	On order	Free
				0.00	0.00	0.00	0.00

- (ii) In the **Product Code** field, either enter in the Product Code (if known) or click on the "Magnifying Glass" button to carry out a search.
- (iii) Check the **Date** is correct and enter a reference in the **Reference** field. This could be a works order etc.
- (iv) Move to the **Qty** field and enter in the quantity you want to issue.
- (iv) Move to the **Cost Price** field and enter in the bought-in price per unit.
- (vi) Enter in more items (if necessary) on each subsequent line.
- (vii) Once you are complete, click on **Save**.

Sage: Viewing Stock

- (1) Click on the **Products** button. A window similar to this will appear:



The screenshot shows a window titled 'Products' with a menu bar and a toolbar. The toolbar contains buttons for Record, Activity, In, Out, Transfer, and Reports. Below the toolbar is a table with the following data:

Product Code	Description	Sales Price	Qty
APS1	APS 10 14 255	0.00	26.00
APS10	APS 12.5 17.5 305	0.00	0.00
APS11	APS 12.5 17.5 460	0.00	0.00
APS12	APS 13 17 1220	0.00	0.00
APS13	APS 13 17 760	0.00	0.00
APS14	APS 15 20 1000	0.00	0.00
APS15	APS 15 21 1500	0.00	0.00
APS16	APS 15 21 1600	0.00	0.00
APS17	APS 15.5 21 150	0.00	0.00

At the bottom of the window, there are buttons for Criteria, Swap, Clear, Delete, and Close.

There are two ways to find a product item:

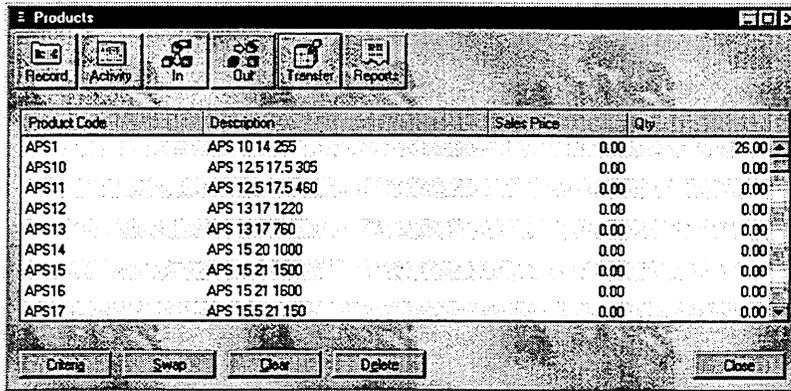
- (a) Either scroll up and down the list and highlight the one you want. Then click on **Record** to bring up details of the item.

OR

- (b) Click on **Record** and either enter or search for the product you want.

Sage: Stock Item History

- (1) Click on the **Products** button. A window similar to this will appear:



The screenshot shows a window titled 'Products' with a menu bar containing 'Record', 'Activity', 'In', 'Out', 'Transfer', and 'Reports'. Below the menu bar is a table with the following data:

Product Code	Description	Sales Price	Qty
APS1	APS 10 14 255	0.00	25.00
APS10	APS 12.5 17.5 305	0.00	0.00
APS11	APS 12.5 17.5 460	0.00	0.00
APS12	APS 13 17 1220	0.00	0.00
APS13	APS 13 17 760	0.00	0.00
APS14	APS 15 20 1000	0.00	0.00
APS15	APS 15 21 1500	0.00	0.00
APS16	APS 15 21 1600	0.00	0.00
APS17	APS 15.5 21 150	0.00	0.00

At the bottom of the window, there are buttons for 'Print', 'Swap', 'Clear', 'Delete', and 'Close'.

There are two ways to find a product item:

- (a) Either scroll up and down the list and highlight the one you want. Then click on **Activity** to bring up details of the item's history. Before this, you will be asked to enter dates to search for. Normally, the default dates will suffice.

OR

- (b) Click on **Activity** and either enter or search for the product you want. Before this, you will be asked to enter dates to search for. Normally, the default dates will suffice.

If a product code is not provided, you can search for the item using the "Magnifying Glass" button. If necessary (and if you have been authorised), you can create a code for the **DIRECT** warehouse **ONLY** by carrying out the following procedure. (if your product is for **CASTLETON** or for **EX-STOCK**, please ask the Storeman to create the code for you).

- (4) The cursor will move to the **Description** field. Click on the **Pen** button to bring up the following box:

Fill in the **Description** field and add additional details in the **Comment 1** and

Comment 2 fields.

- (5) Enter the quantity required in the **Quantity** field.
- (6) Click on **Unit Price** to enter a price per unit for the item required.
- (7) If a discount is to be given, fill this in either in the **Discount %** field (if a percentage amount has been quoted) **OR** in the **Discount** field if a monetary value has been given).
- (8) Fill in the correct Nominal Code in the **Posting Details** section.
- (9) Make sure that the correct department is displayed in the **Department** box,
- (10) Once you are happy with all of these details, click on **OK**. Sage returns you to the Purchase Order window.

If you need to, enter more items in the same way.

- (11) There are three "tabbed" boxes at the top of the Purchase Order window.

Click on the **Order Details** tab.

- (12) Enter in a **Delivery Address** if this is different from the Invoice address. This will appear on the printed Sales Order.
- (13) Enter in details in the **Customer Order Details** section.
- (14) **NB: It is important to enter a name or area in the "ORDER TAKEN BY" field.**
- (15) In the **Order Status** section, click on the **Due Delivery** "calendar" and double-click on the due delivery date for the item.
- (16) Click on the **Footer Details** tab at the top of the Sales Order window.

The following window is opened:

The screenshot shows a window titled "Sales Order" with three tabs: "Main", "Order Details", and "Footer Details". The "Footer Details" tab is active. The window contains several sections of input fields:

- Carriage:** Net (10.00), T/c (T1 17.50), V.A.T. (1.75), Gross (11.75), N/C (4905), Dept (0).
- Settlement Terms:** Days (0), Amount (0.00), Discount % (0.00), Total (188.00).
- Global:** N/C (), Details (), Tax Code (T1 17.50), Dept (0).

At the bottom of the window, there are buttons for "Save", "Abandon", "Print", "Complete", and "Close".

- (17) Enter carriage details.
- (18) In the **N/C** field, type the number relating to Carriage for Nominal Ledger purposes. This Code will be given to you shortly.

It is important that this field be filled in. Please do not continue until you have filled this in.

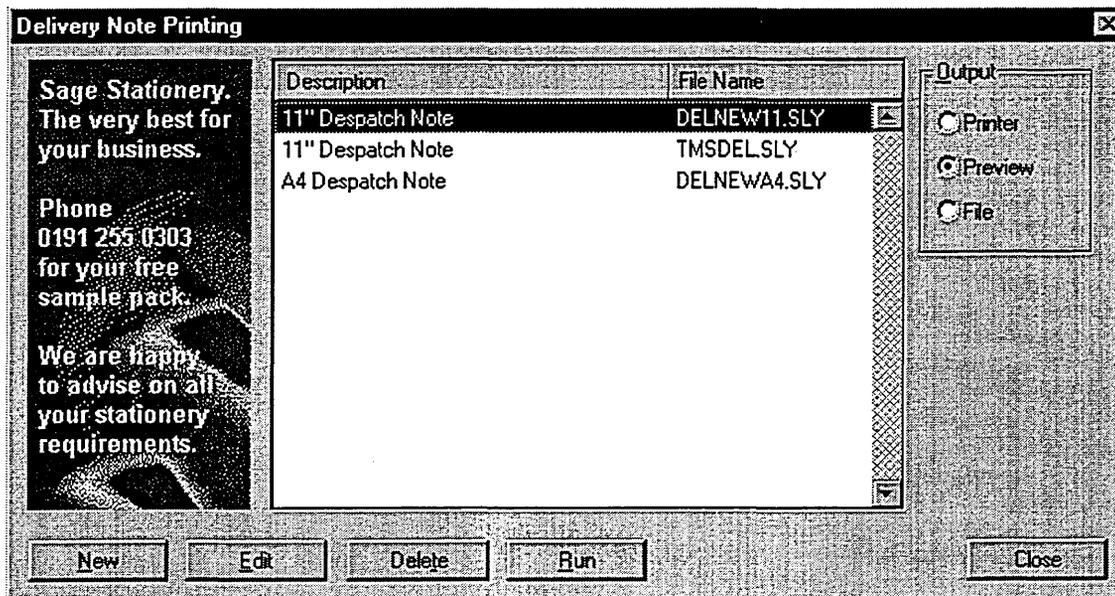
- (19) The Sales Order is now complete. If you want to enter another Sales Order (and/or if you do not want to print the order yet), click on the **Save** button.
- (20) Repeat the Sales Order process if necessary.

Sage: Allocating Stock

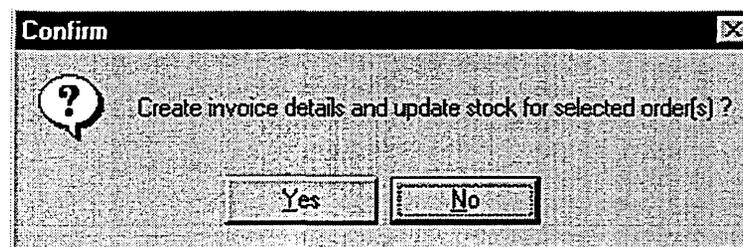
- (1) Click on the **SOP** button.
- (2) Highlight the Sales Order(s) that you want to allocate stock for.
- (3) Having highlighted it/them, click once on the **Allocate** button.
- (4) A dialog box appears telling you that Sage is about to allocate stock items to Sales Orders.

Sage: Sending Despatch Notes

- (1) Click on the **SOP** button.
- (2) Highlight the Sales Order(s) that you want to generate Despatch Notes for.
- (3) If no stock has been allocated to one or more of the orders, a warning box will appear. **Allocate stock to the orders first**
- (4) Having allocated stock and highlighted one or more Sales Orders, click once on the **Despatch** button.
- (5) A warning box appears asking you to confirm printing of despatch notes. On clicking **YES**, the following box should appear:



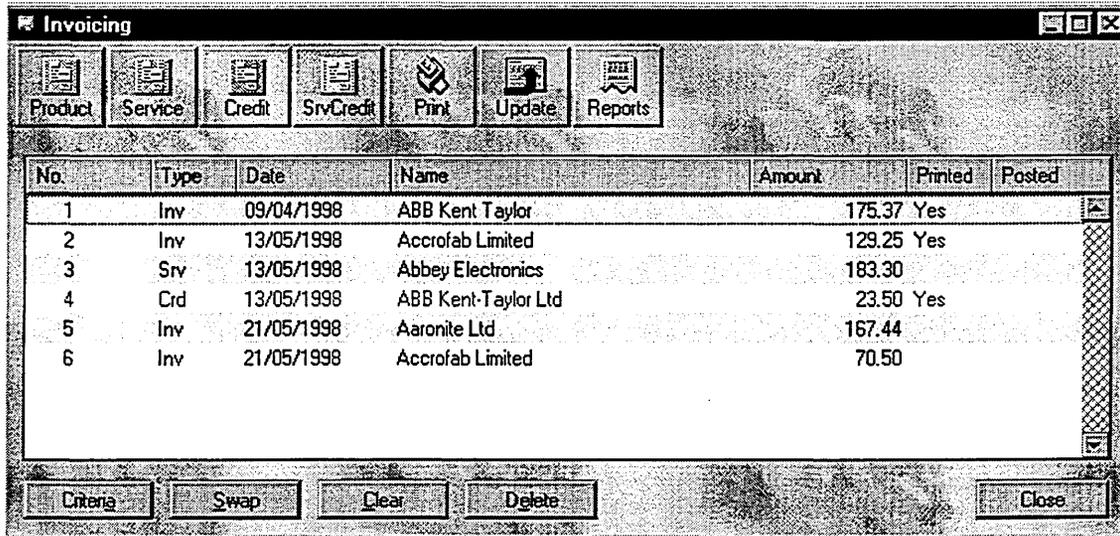
- (6) Select the TMS template (by highlighting if necessary).
- (7) Ensure that the **Output** section has been set to **Printer** if you want to print.
- (8) Click on **Run**. The following box may appear. Click on **YES** if you want to update stock details and create invoice details.



- (9) If all is well, another dialog box will appear. From this you can confirm (or select) the printer you want to print the Delivery Notes to.

Sage: Generating Sales Invoices

- (1) Click on the **Invoicing** button.



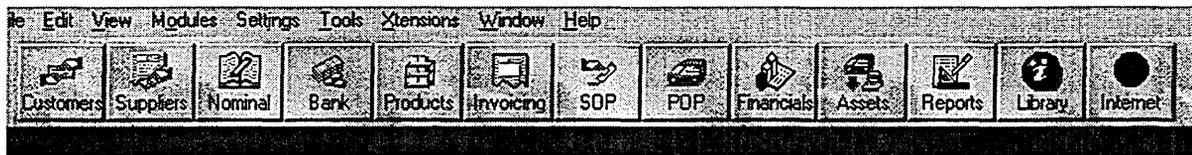
- (2) Select the Sales Order(s) you wish to generate Sales Invoices for (by highlighting it / them).
- (3) Press the **Print** button to print Invoices out for these highlighted orders.
- (4) If all is well, a box will appear asking you to select the printer template. Select TMS Invoice.
- (5) Ensure that the **Output** section has been set to **Printer** if you want to print.
- (6) Click on **Run**. A warning box will appear. Click on YES if you definitely want to print.

Sage: Outstanding Items procedure

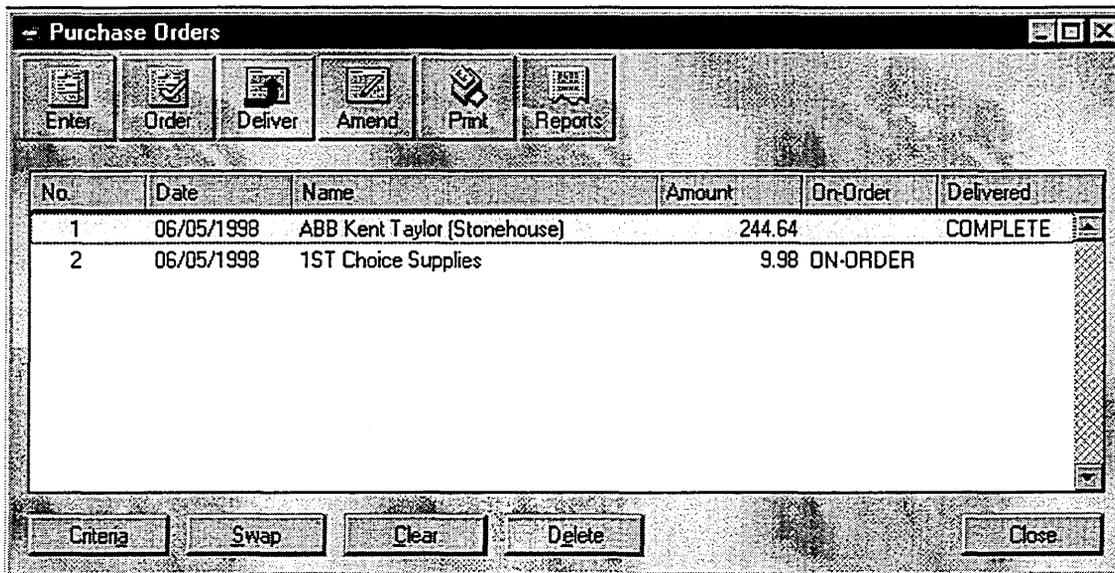
Entering Outstanding Purchase Orders

Using the outstanding Purchase Order report (generated from TETRA), enter these orders into the new Sage system.

Once you have entered Sage (after entering the correct login name and password), click on the "POP" from the buttons on the Main Menu screen:



On clicking this button, the following screen will appear:



Click on the **Enter** button to bring up the following box:

Stock Code	Description	Qty	Net	V.A.T.
Totals			0.00	0.00
Carriage			0.00	0.00
Gross				0.00

- (1) In the Order No. box, enter the appropriate Purchase Order number (not including the prefixes such as BH, AM, HM etc).
- (2) Go to the A/C Reference box and find your chosen supplier. The supplier details will automatically appear.
- (3) Click on the **Stock Code** box to bring up a list of available products.

Stock Code	Description	Qty
		0.00
19358A	TYPE K THERMOCOUPLE	
19361A		
301PAR1	CHS 301 CHT MTR 60HZ	
301PAR10	SVC 300/301 GEARS G8	
301PAR11	SVC 300/301 GEARS G9	
301PAR12	SVC 300/301 GERS G10	

For entering **outstanding Purchase Orders only**, click on the **New** button.

The following box will appear:

Product Record

Details Memo

Product Code: New Product In Stock:

Description: Allocated:

Department: Free Stock:

Category: On Order:

Location: Last Ord Qty:

Com. Code: Weight: Last Ord Date:

Nominal Code: Tax Code: Re-order Level:

Supplier A/C: Part No.: Re-order Qty:

Sales Price: Unit of Sale: Cost Price:

Ignore Stock Levels Stock Take Date: Stock Take Qty:

Save Abandon Close

- (4) In the **Product Code** box, type the Works Order number to which the product is linked (eg. if a C100 unit has been ordered for Works Order 15652, you would enter 15652 in the box).

If there is more than one product item for the Order, end the Works Order number with an A, B, C, D etc: eg. 15652A, 15652B etc).

- (5) For Direct items (those items which are straight in and straight out), you would need to fill in the following boxes only: Description, Department (W,I,N,X,R or S) and the Category would be 2 - Direct Warehouse.

Fields such as additional detail and cost can be entered on the Purchase Order form.

- (6) Click on the **Save** button
- (7) The Product Record screen will close and Sage will return you to the **Purchase Order** screen. The new product you have entered will be highlighted. Click on OK to accept this item.

Stock Code	Description	Qty
APS61	APS 8 12 915	
RAJ1		<input type="text"/>
		Total

- (8) The cursor will move to the **Description** field. Click on the **Pen** button to bring up the following box:

Product Item Line

Product Details

Product Code: RAJ1

Description:

Comment 1:

Comment 2:

Product Line Details

Quantity: 1.00 Discount %: 0.00

Unit Price: 0.00 Discount: 0.00

Net: 0.00 Tax Code: T1 17.50

VAT: 0.00

To Deliver: 1.00 Delivered: 0.00

Calc. Net OK Cancel

Fill in the **Description** field and add additional details in the **Comment 1** and **Comment 2** fields.

- (9) Enter the quantity required in the **Quantity** field.
- (10) Click on **Unit Price** to enter a price per unit for the item required.
- (11) If a discount is to be given, fill this in either in the **Discount %** field (if a percentage amount has been quoted) **OR** in the **Discount** field if a monetary value has been given).
- (12) Once you are happy with these details, click on **OK**. Sage returns you to the Purchase Order window.

Purchase Order

Main Order Details Footer Details

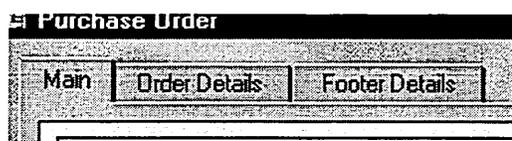
- (13) There are three "tabbed" boxes at the top of the Purchase Order window. Click on the **Order Details** tab to bring up the following window:

The screenshot shows a window titled "Purchase Order" with three tabs: "Main", "Order Details", and "Footer Details". The "Order Details" tab is active. The window is divided into several sections:

- Delivery Address:** A large empty text area.
- Notes:** A large empty text area.
- Supplier Order Details:**
 - Supplier Order No. [Empty]
 - Supplier Tel. No. [01246 454077]
 - Supplier Contact [Empty]
 - Order Taken By [MANAGER]
- Order Status:**
 - Order: [ON-ORDER]
 - Deliver: [Empty]
 - Due Delivery: [Empty] with a calendar icon.

At the bottom of the window, there are five buttons: "Save", "Abandon", "Print", "Complete", and "Close".

- (14) Enter in a **Delivery Address** if this is different from the Invoice address. This will appear on the printed Purchase Order.
- (15) Enter in details in the **Supplier Order Details** section.
- (16) **NB: It is important to enter a name or area in the "ORDER TAKEN BY" field.**
- (17) In the **Order Status** section, click on the **Due Delivery** "calendar" and double-click on the due delivery date for the item.
- (18) Click on the **Footer Details** tab at the top of the Purchase Order window.



(19) The following window is opened:

Purchase Order

Main | **Order Details** | Footer Details

Carriage

Net	6.25	T/c	T1 17.50
V.A.T.	1.09	Gross	7.34
N/C		Dept.	0

Settlement Terms

Days	0	Amount	0.00
Discount %	0.00	Total	20.26

Save | Abandon | Print | Complete | Close

(20) Check the carriage details are correct.

(21) In the **N/C** field, type the number relating to Carriage for Nominal Ledger purposes. This Code will be given to you shortly.

It is important that this field be filled in. Please do not continue until you have filled this in.

(22) The Purchase Order is now complete. If you want to enter another Purchase Order (and/or if you do not want to print the order yet), click on the **Save** button.

(23) Repeat the Purchase Order process if necessary.

memo

To: All departments
From: Raj Bali

Date: 14 July 1997
Ref: memo13.doc

Re: Entry of Sales and Purchase Orders

Please be aware when entering Sales and Purchase orders that:

- (1) **the correct product code has been entered**
if you are unsure, do NOT guess or assume, please ask
- (2) **the same product code is entered onto Sage AND onto any paperwork**
if you are unsure, do NOT guess or assume, please ask
- (3) **the correct department has been entered**
this can be checked by clicking on the pencil symbol on **Description**:

Product Code	Description	Qty	Net	V.A.T.
25	SERVICE AND CAL. OF HEAT	1.0000	312.00	54.60
Totals			312.00	54.60
Carriage			0.00	0.00
Gross			366.60	

this will bring up the following screen:

Product Details	
Product Code	25
Description	SERVICE AND CAL. OF HEAT
Comment 1	MEASURING INSTRUMENTS
Comment 2	

Product Line Details			
Quantity	1.0000	Discount %	0.00
Unit Price	312.0000	Discount	0.00
Net	312.00	VAT	54.60
Allocated	0.00	Despatched	1.00

Posting Details	
Nominal Code	4000
Tax Code	T1 17.50
Department	6 S - SERVICE

The bottom box will show which department the product or service belongs to. Check that this is correct.

Raj Bali

memo

To: Managing Director
Lisa Green

Date: 21 October 1997

From: Raj Bali

Re: Internet

Our TEC-assisted experiment with the Internet and Email facility will shortly come to an end. For our records, the following is of note:

Renewal

Our email account renewal is due on 18 September 1997. I have tried to get indications of cost but they have said that this will only be available on the renewal notice

Email and Website

In summary, our trial regarding the Internet has been useful and, given the numerous emails to and from America (disregarding the last few weeks!), the email facility has proved its use and "immediacy" when attaching documents and graphics and receiving new versions of ACCRA-CAL from Dave Shaw.

The Web Site has been less of a success. Our interest in the Internet was to *make the customer come to us*, generating enquiries and, as a result, extra sales.

The various structural changes and the general lack of organisation at the TEC's partner, HighPeakNet, has resulted in a delay of several months in getting our Web Site up and running.

The text, pictures and logos that I supplied to HighPeakNet have been partially put on the Net but I am far from happy with the quality of the resultant page.

A second page, with the option of downloading ACCRA-CAL etc, seems to have been ignored; this was of vital importance in order to gain international enquiries.

As a matter of interest, HighPeakNet does not exist anymore and all problems relating to them have been faxed to Heather Smith at the TEC who will forward them to the new team.

memo

To: All departments
From: Raj Bali

Date: 21 October 1997

Re: Stores

Please note the following booking-out procedures **effective immediately**.

Authorised Persons

Brian, Steve, Raj, Anthony and Barrie Hanwell are the only persons authorised to book out items from stock on the computer.

Stock Issues

You may book out items on the card only.

The card must be completed clearly in case we need to query any transactions.

Place the completed card in the first brown tray next to the Stores computer.

Manual List

This list should only be used in the exceptional circumstance when you cannot locate the stock card

To summarise, you may not remove any items from stores unless:

- (i) they have been booked out on the computer by an authorised person *or*
- (ii) you have clearly completed and left the card in the brown tray *or*
- (iii) you have made a clear entry on the Manual List

I re-iterate that the above procedures are **effective immediately**.

Raj Bali

addendum

To: All departments
From:

Date: 22 October 1997

Whilst we keep making moves and improvements on our stocking system and stores inventory management, this is subverted by individuals not following procedures, thus rendering the information unreliable and ultimately untrustworthy. Not only does this create a lot of unnecessary work, it also means that our financial information is suspect which means Auditors and Bankers are sceptical to accept our valuations.

The systems are in place and **MUST** be used. Note Raj's memo of 21 October 1997 but also, **with immediate effect, Steve or Brian must accompany anyone removing or putting goods into stores.**

Managing Director

XXX Company Tour

IN CONFIDENCE

Employee Name:

Date:

Title:

Dept:

QUESTIONS

Could you describe your role here at **XXX**?

How long have you been at **XXX**?

In your opinion, what are the major problems here?

If you use computers as part of your job, tell me if you enjoy using them?

If you use computers, are they sufficient for your tasks?

Are there any tasks that you need to carry out but can't (because of the computers)?

Additional Comments

Monthly Meeting Feedback Form

Name:

Meeting Date:

Meeting Topic:

Location:

FEEDBACK

Please circle below (1=low, 5-high) the **effectiveness** of the above presentation:

1 2 3 4 5

Please circle below (1=low, 5-high) your **understanding** of the above presentation:

1 2 3 4 5

Please circle below (1=low, 5-high) how much you **agree** with the above presentation:

1 2 3 4 5

COMMENTS

Please use this space to make any additional comments you may have regarding the presentation.

THANK YOU

Appendix E

Appendix E: Research Papers Papers published

- (1) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "MISCO: A Conceptual Model for MIS implementations in SMEs", *Information Research*, Vol.4, No.4, June 1999, ISSN: 1368-1613
 - (2) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "Changing Organisational Culture for Successful MIS Implementation: A Case Study", *Proceedings of the Sixth International International Conferences on Advances in Management*, Baton Rouge, Louisiana, USA, July 7-10, 1999, Volume 6 (1999), ISSN: 1059-356X
 - (3) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "Considering Culture: The MISCO Model For MIS implementations in SMEs", *Proceedings of the Sixth International International Conferences on Advances in Management*, Baton Rouge, Louisiana, USA, July 7-10, 1999, Volume 6 (1999), ISSN: 1059-356X
 - (4) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "Successful Technology Management: Considering Organisational Culture", *Proceedings of the Sixth International International Conferences on Advances in Management*, Baton Rouge, Louisiana, USA, July 7-10, 1999, Volume 6 (1999), ISSN: 1059-356X
 - (5) BALI, R., COCKERHAM, G., BLOOR, C. (1999) "Ethical Ethnography: Immersion and the role of Access", *Proceedings of the Sixth International International Conferences on Advances in Management*, Baton Rouge, Louisiana, USA, July 7-10, 1999, Volume 6 (1999), ISSN: 1059-356X
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No 1 July 1998

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No 3 January 1998
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Working Papers

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● "In the catalogue ye go for men": evaluation criteria for information systems, by Julian Warner, School of Management, Queen's University Belfast.

● Publishing, bookselling and the World Wide Web, by Paul Kipling and R. G. Wilson, Department of Information Studies, University of Sheffield.

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1999**

MISCO: A Conceptual Model for MIS Implementation in SMEs

R.Bali, G.Cockerham

School of Engineering, Sheffield Hallam University,
Sheffield, UK S1 1WB

&

C.Bloor

School of Computing & Information Systems, University of Sunderland,
Sunderland, UK SR1 3DD

Abstract

Information Technology ('IT') has made a prolific impact, both in sociological and commercial terms. In the business world, the pursuit of new technology and working practices has often been at the expense of equal regard for the correct methods to manage the new technology. Contemporary IT techniques and methods include Management Information Systems ('MIS') which are normally implemented on a company-wide basis. However, MIS implementation has major cultural and organisational implications which will form the main focus of this paper. A conceptual model is proposed for successful MIS implementation which combines established research findings with ethnographically-informed data from a small, UK-based, business.

Introduction

Definitions of culture are widespread and the difficulty in refining down to a single definition is exacerbated when it is considered that over 150 different definitions of the term "culture" have been formed [Kroeber & Kluckhohn, 1952]. For the purposes of this paper, the most cited definition of Culture as being the collective programming of the human mind which distinguishes members of one group from another [Hofstede, 1994a] will be used.

Extending the notion of culture into an organisation leads us to the definition of Organisational Culture which is the pattern of basic assumptions [Schein, 1990] used by individuals and groups to deal with an organisation's personality and feel. It is this same organisational culture which defines behaviour, motivates its individuals and affects the way in which the organisation processes information.

Researchers are generally agreed [Schultheis & Sumner, 1995; Sherman, 1985; Lucey, 1991] that organisational IT implementations occur for the following reasons (either individually or in combination): to improve efficiency, to improve effectiveness and to bring about transformation. A Management Information System can be defined as an integrated structure of databases and information embracing all organisation levels of a company [Lucey, 1991] which facilitates the optimum transfer of information to meet corporate objectives.

Researchers and authors have analogised organisations to an iceberg [Gibson et al, 1994; Gummeson, 1988] which shows only 10-15 percent of its total mass above the surface water [Gummeson, 1988] and is thus a suitable analogy to show the visible and non-visible facets to an organisation's culture. This analogy demonstrates the importance of deeper research in an organisation in order to gain access to the submerged 85-90 percent of the organisation's value and belief system.

Several factors can combine to form the basis of an organisation's culture, examples of which include: reports, letters, memos, emails, health & safety regulations and rulebooks. Some examples of protocols of a more-verbalised nature include forms of

addresses, repeated stories/myths, "in"-jokes, rumours and speculation. Factors such as dressing styles/requirements and programmed organisational career paths can also contribute to an organisation's culture.

The justification for a new approach

Although several established culture-change models exist (Hofstede 1994b], Lundberg [1985], Schein [1985, 1990], Dyer [1985], Gagliardi [1986] and Lewin [1952]), they are often more suitable for some organisations and less suitable for others. A review of the inherent issues involved in these established frameworks demonstrates the different cultural basis that established researchers and practitioners have used. The suitability of these models is generally for circumstances and situations of relevance at the time of their inception. The ideal cultural change model may well be a skilful blend of the most pertinent tools and techniques from the existing range of cultural and organisational change models.

The proliferation of IT during the 1980s [Sherman, 1985] impacted strongly on the perceptions of business managers. Researchers and Authors [Hirschheim, 1985; Sherman, 1985; Noori, 1988] have confirmed that, throughout the 1980s, technically-oriented staff employed by organisations recognised the severe gap in their organisational recommendations and the perceptions and expectations of non-technical managers.

The cultural gulf between management and IT staff [Ward & Peppard, 1995] encompasses the notion of sub-cultures and the traditional IT function has been often regarded as just another department within the evolving organisation. In reality, the culture of the IT department is often specifically geared towards achieving strategic growth through the use of contemporary IT techniques. Conversely, management, privy to (and perhaps governed by) financial constraints, are often content to expand on existing legacy systems which are ill-suited to achieving contemporary corporate goals.

It is issues such as these which necessitate a new Organisational Culture-IT framework, a framework which, although having its foundations in established cultural models, embodies recent and novel findings. The coterminous constraints of established theoretical models can be fused with new endemic elements to produce an exploratory and explanatory conceptualisation of a contemporary Small Business. In this paper, new data for the new framework contains significant input and findings from an extended ethnographic case study.

Ethnographically-informed data

The ethnographic study examines the organisational culture at Thermo-X, a pseudonym for a Derbyshire-based owner-managed company. The company employs about 30 people on two sites in the design, manufacture and calibration of thermocouples, resistance thermometers and special purpose instruments. The Managing Director ('MD') is also the owner of the business and has substantively set up the operational procedures and established systems.

Thermo-X has been involved in a Teaching Company Scheme ('TCS') with Sheffield Hallam University for a three year period. The primary objectives of the Scheme were to improve manufacturing performance by the introduction of stock-control software, to introduce manufacturing resource planning (MRPII) and to improve existing operational procedures and control. A secondary objective, and an integral part of the primary aims, was the introduction and demonstration of contemporary IT methods and techniques.

Resistance to Change

Researchers ranging from Earl [1993] to Zmud [1984] agree that organisations

attempt to change their culture in order to bring about a strategic change such as the introduction of a Management Information System. Confirmed by Brown [1995], established culture-change researchers have put forward several cultural change models with no framework in clear dominance.

Due to the numerous and varied definitions of culture, it may be apparent that attempting to change organisational culture according to one researcher's model may be significantly easier than using another researcher's framework. The very diversity of the culture-change models contributes to illustrate their respective weaknesses in addition to their intended strengths. Given that the various models have provided great insights into the culture change process, the highlighted concerns should be explored further.

A literature review of the culture-change frameworks has shown that different researchers vary in their preference of a basis for culture. None of these models or frameworks is necessarily wrong as each possesses its own advantages and disadvantages and the ideal cultural change model may well be a skilful blend of the most pertinent tools and techniques from this range. The ethnographically-informed data has confirmed that organisational culture change and a successful change programme possesses several common precepts: the existence of an initial crisis, the importance of a strong leadership, emphasising the importance of success and relaying news of the success and the importance of supporting change.

Several exercises were carried out in an effort to change the organisational culture in order to successfully accommodate the impending IT implementation. The Model incorporates the various culture-directed activities carried out at Thermo-X in order to stylise the culture in preparation for the impending IT overhaul.

The MISCO Model: Validation and Common Themes

Specific issues highlighted from the ethnographic study will now be discussed, including which techniques are of particular relevance, whether certain facets are be actioned in a particular order and whether elements are etic or emic in their applicability to a UK-based SME. The issues highlighted suggest that the ideal solution cannot be purist or dogmatic in its nature or outlook. The factors involved are not just characteristic to the disciplines of Management and Information Technology but are also induced from and informed by areas as diverse as Psychology, Politics and Sociology. Recognising that the new approach encroaches on seemingly dissimilar, non-homogenous, subjects will be an integral part to its acceptance and subsequent usefulness.

The MISCO Model was "walked through" with key personnel at several external organisations in order to test its suitability to the organisation. Validation revolved around key questions; the feedback of participants was both constructive and useful. It was the purpose of these organisational experiences to support or contradict the constructs put forward in the MISCO Conceptual Model. Analysis of the interviews at the four SMEs revealed a commonality of interests and experience in a number of different areas, the most important of which will now be discussed.

All of the interviewed SMEs, including Thermo-X, carried out an evolutionary IT route, expanding on legacy systems in order to further company ambitions. Prior to the implementation of the new MIS, no formalised or recognised IT Implementation Plan had been used. Hence, duplication of several data processes and procedures was commonplace (for example, involving Accounts and Order Processing).

For all of the interviewed companies, moving to the new MIS has required the replacement of obsolete equipment and the subsequent procurement of new hardware, software and network infrastructure. Management involvement in the definition of new requirements, both on an historical basis and for the new MIS, has allowed

experienced users to participate in the Requirements Definition phase of implementation.

Reliance on legacy systems has often been indicative of the organisation's culture (a reluctance to replace ineffective and outdated information systems). Disparate development and installation of stand-alone software packages in some departments has not facilitated central co-ordination of IT activities. This individual technical approach is mirrored by the existence of departmental "sub-cultures" in all of the visited SMEs (for example, people in a Service department carrying out procedures in a vastly different manner to people in a Manufacturing department).

Provision of proper IT Training has often had minimalist presence at the SMEs. Interviews have revealed that even the legacy system were not used to their full potential. Recognition of this, and emphasising its importance for the new MIS, is a key element of the MISCO framework. Transfer of data has often been on a non-standard basis with no reference to Best Practice or recognised IT procedures. A simple example would be data transfer by disk rather than via a secure network connection. The risks to data integrity, reliability and exposure to viruses are all too apparent.

MISCO Model: Introduction

The MISCO (Management Information System Culture-Organisation) Model comprises a set of activities and techniques to prepare SME organisations for MIS implementation. MISCO has six main stages. Stage 1 is recognition, followed by Stage 2 consisting of IT Training and Education. Stage 3 consists of the following activities: pilot schemes, communication, education, facilitation, dissemination and mentoring. The analysis and evaluation stage (Stage 4) incorporates a feedback loop. Stage 5 breaks down into an acceptance activity leading to the final stage (Stage 6), stability. This final stage also incorporates a feedback loop back to Stage 2. A "cause-effect" relationship exists between activities, where the outputs of an activity become inputs for the next MISCO activity.

MISCO Stages

MISCO comprises a group process for UK-based SMEs and, in this context, can be regarded as both a methodology and a process. MISCO can be broken down into six main stages, some of which can be broken down into several component activities. All stages consist of several multifarious, yet interrelated, activities.

Identification of the activities within these six stages, in addition to guidelines, tools and techniques to be used, is important in the interests of correct understanding and application. Identifying the personnel involved in all stages will also be of paramount importance. The activities involved in each of the stages can be summarised as follows:

- Stage 1: Recognition
- Stage 2: IT Training and Education
- Stage 3: Cultural and Organisational Change
 - Step 1 - PS: Pilot Schemes
 - Step 2 - CM: Communication
 - Step 3 - ED: Education
 - Step 4 - FC: Facilitation
 - Step 5 - DS: Dissemination
 - Step 6 - MN: Mentoring
- Stage 4: Analysis & Evaluation
- Stage 5: Acceptance
- Stage 6: Stability

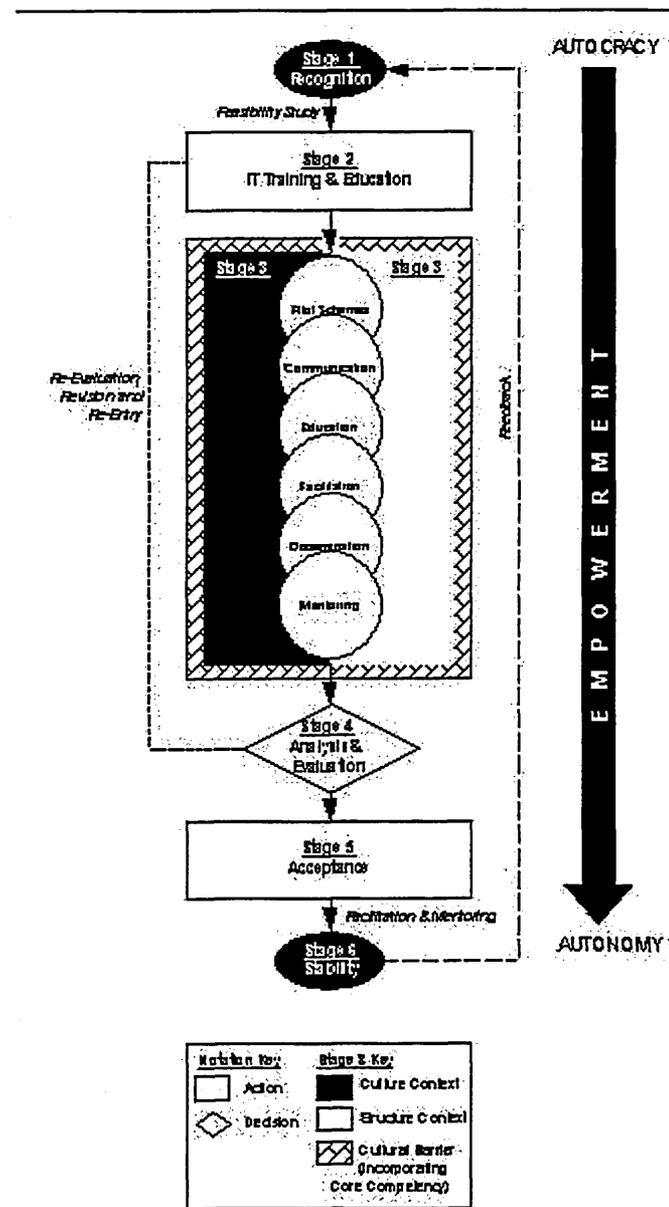
Detailed descriptions of the above activities are provided in the section titled

"MISCO Stages and Activities", together with a discussion of the personnel involved. A schematic illustrating the MISCO constructs is provided in Figure 1.

From Figure 1, it would appear that the MISCO model is a relatively simple process. Stages and Activities are linked in an "input-output" relationship. The relationships can be described as "input-output" as they are carried out in sequence. The relationships exist as inputs and outputs of their respective predecessors (ie. an output from one process or stage becomes an input for another). These same relationships may or may not be carried out by the same group of people.

The schematic, Figure 1, aims to conceptualise the change process. The aims and objectives of the schematic are to provide a clear and concise view of the MISCO change process. Feedback loops are shown where applicable. For example, whilst performing out the activities in Stage 3, SME members (after evaluation of progress made) may decide to return to Stage 2. Returning to Stage 2 at this point indicates ineffective or insufficient progress being made during Stage 3 (Pilot Scheme, Communication, Education, Facilitation, Dissemination and Mentoring).

Figure 1: MISCO constructs



Emulating established methodologies, such as PRINCE, it is recommended that the MISCO change process be split into two groups: the MISCO Support Team (consisting of at least one member, the facilitator) and the MISCO Management Committee. The MISCO Management Committee is a group of senior personnel (at the company and perhaps from external support organisations) who co-ordinate, support and oversee implementation and progression of the MISCO framework.

The MISCO Management Committee is a body set up to control the development of the MISCO change process. The Committee has representation from various interested parties (such as company management and academic support). Typically, the Committee might have senior user representatives in addition to personnel from other departments (or departmental functions) such as accounts, purchase, HRM, sales and so on. The Committee should have the authority to make executive decisions on the MISCO project.

The MISCO Support Team is a group of personnel whose main function is to provide members of the SME with technical and organisational support and advice. The main

function of the MISCO Support Team is to organise, document and carry out the inherent constructs of the MISCO framework.

MISCO Organisational Roles

As discussed in Section 7.2, the MISCO change process should be carried out by at least two people, one of whom assumes the role of the implementor, the other should be a representative of top-line management.

The MISCO Support Team should co-ordinate the activities of the group and should interact with the MISCO Management Committee. Key responsibilities of the MISCO Support Team (or implementor) include:

- Scheduling meetings and ensuring that all necessary resources are available (eg. OHPs, flip-charts).
 - Making contact with organisational (company) members and ensuring that they are able to take part in the group meetings (either in person or using an electronic medium such as email).
 - Organising the documentation generated by group discussion and, after the meeting is finished, supplying the MISCO Management Committee with this documentation.

In the MISCO Support Team, the facilitator is responsible for summarising performance information about the change process and for highlighting opportunities for improvement. These responsibilities demand of the facilitator a thorough understanding of MISCO's criteria, guidelines, tools and techniques. However, the facilitator should not solely decide on the adoption of specific changes. This is a prerequisite of the MISCO model as changes and future directions should be obtained by group consensus.

The other members of the group should provide input, with executive decisions resting with the facilitator. In smaller organisations, it may be practicable for one person to play two or three roles, for example group leader, facilitator, and to provide inputs as a "group member". There is a danger at this point that objectivity will be lost.

MISCO Guidelines

Apart from the guidelines listed in the previous section, there are a number of additional guidelines which are relevant to the MISCO change process on a macro level. Such points are not necessarily associated with a particular stage or activity but are nevertheless an integral part of the framework:

Documentation

The stages which the MISCO Support Team executes should be properly documented. The facilitator should possess full responsibility for documenting these processes as this historical data may prove to be of significance either in later stages or activities of the MISCO change process or in subsequent change programmes.

Linked Meetings

Each meeting should, if possible, link to the previous meeting. An introduction to the meeting should link the main themes of the previous meeting (or meetings) with the aims and objectives of the current meeting. Each meeting should end with a summary of the main points which have been discussed. This summary can become the basis of the introduction for the next meeting. Such an approach can be justified in the interests of group cohesion and focus.

Group Cohesion

Group "cohesiveness" (described earlier) is an integral part of the MISCO model. The facilitator should not use autocratic management methods to "enforce" such cohesion as this approach is contrary to that desired in MISCO.

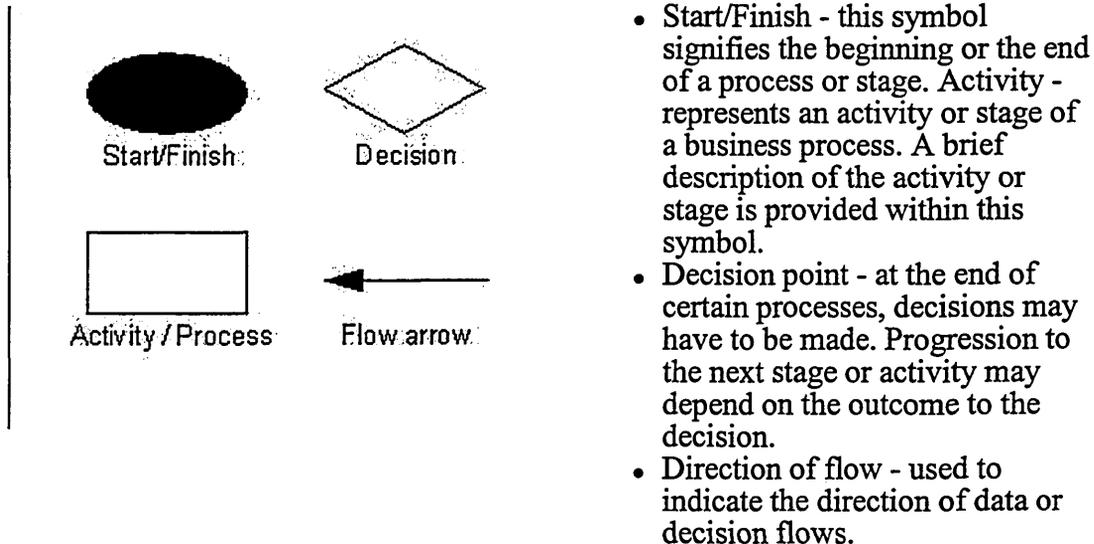
Feedback

The feedback loops shown in the MISCO model should be carried out in good time. Unduly deferring action (or re-action) endangers cohesiveness and the overall impetus of the project. Conversely, not waiting for a sufficient amount of time may infer to the organisation a hurried or superficial implementation approach. Future research may indicate a desired time for implementation (or re-implementation).

MISCO flow chart notation and guidelines

The MISCO framework has been conceptualised using flow chart notation, the chief aim of which was to understand the relationship between the stages and activities. By doing so, a clear understanding of the MISCO change-process is achieved. The MISCO flow chart represents processes using ANSI standard flow chart symbols. MISCO uses only four symbols: the Start/Finish ellipse, the Activity rectangle, the Decision diamond and the Flow arrows, depicted in Figure 2.

Figure 2: MISCO Flowchart Notation



The MISCO schematic is accompanied by a full narrative of the depicted stages and activities. Without this, information and understanding may be lost. Such information would not be appropriate for inclusion on a schematic but is invaluable for facilitating understanding of the model.

MISCO Stages and Activities

MISCO involves a number of different stages and activities. The following section discusses MISCO tools, techniques and guidelines appropriate for each stage and activity. Stages and activities will be listed in desired order of execution.

Stage 1: Recognition

In this first key activity, the organisation recognises that problems exist and these are identified. As discussed earlier, the facilitator should lead, motivate and co-ordinate the activities of the MISCO Support Team. This approach takes responsibility of problem identification away from the MISCO Management Committee. However, the Committee should be encouraged to participate fully in these early stages, as

previous knowledge of the organisation's history and previous organisational or industry experience of Committee members may be extensive and relevant to these initial discussions. Additionally, including the views of the MISCO Management Committee broadens MISCO's impact as it does not then rely on the initiative and experience of a limited number of managers.

This initial stage identifies previous and current organisational problems. Given that most business processes can almost always be improved, identification in this first instance refers to both external and internal pressures. Work by Lundberg [1985] has confirmed that many UK-based SMEs are likely to face a range of varied external pressures. These pressures, relevant to MIS implementation, may include such tasks as the replacement of legacy systems or the need to meet Y2K (Year 2000) compatibility, an important issue at the time of writing. These pressures may result in the organisation changing the way its internal processes and procedures are carried out. Established culture-change authors [Lundberg, 1985; Schein, 1990; Dyer, 1985; Gagliardi, 1986; Lewin, 1952] agree that these changes almost always face resistance from staff within the organisation.

The experiences from Thermo-X and from the external organisations show that, in addition to identification of external pressures, identification of sources of discontent within the company should also be encouraged. It is recognised that these additional problems can enhance the level of motivation among organisation members. This also allows group members to have a clear view of what is to be achieved using MISCO.

A list of identified pressures and problems should be internally checked (by the MISCO Support Team) and then submitted to the MISCO Management Committee for additional verification and validation. The final version of the list should form the basis of the MISCO Support Team and the facilitator should assemble the Team by selecting and inviting prospective group members.

The list of problems should have a *focus*. This is because listing problems which are unrelated or which have an unnecessarily broad outlook can lead to the identification of several different, unrelated, avenues for change. The result of this could be reduce the cohesiveness of the Team and Committee. The approach to problem identification should attempt to emulate that of "brainstorming". All participant should be encouraged to suggest problems, no matter how minute they may appear. No one person's ideas should be ignored or belittled. Once a list (labelled as the "Feasibility Study" on the schematic) has been drawn up, work can begin on prioritising this list.

Internal and external pressures may cause the organisation to change the way its processes and procedures are carried out. Various authors [Lundberg, 1985; Schein, 1990; Dyer, 1985; Gagliardi, 1986; Lewin, 1952] agree that these changes may face resistance from staff within the organisation. Resistance to impending change may not always be of human origin as it may be the case that the existing physical infrastructure or internal working procedures within the organisation may be incapable of accommodating proposed changes.

GUIDELINES

In this first stage, the MISCO Support Team and the MISCO Management Committee should garner opinions and views from all pertinent organisational personnel. It should be appreciated that this stage incorporates a feasibility study from which is generated a list of recognised issues. These issues should be prioritised, similar to the role of a Risk Register in project management. The Qualitative and quantitative data should be used in order to research and identify internal and external pressures.

Stage 2: IT Training and Education

The feasibility study from Stage 1 is used as a basis for identifying key areas of the organisation where attitude, belief and value change is necessary to fully implement the system. The feasibility study facilitates identification of the level and extent of IT training and education required. This training and education will then be used to penetrate the organisation's "cultural barrier" (discussed later). The research has shown that the use of an internal change agent greatly enhances acceptance of the change programme. Stage 2 can be described as an IT preparatory stage which will be built upon with the constructs within Stage 3.

GUIDELINES

The MISCO Support Team and the MISCO Management Committee should, with reference to the feasibility study, clarify which organisational member will participate in the proposed change process. If these members require assistance and support from higher management levels (or external organisations, eg, for training), this should be clearly stated.

Stage 3: Cultural and Organisational Change

This stage consists of six steps which, if possible, should be carried out simultaneously. Note that the schematic does not suggest that these activities are executed sequentially. The overlap of the six "discs" of change are present to suggest sequential activity. The research has shown that the SME culture and organisation change-process is non-linear, hence the suggestion for simultaneous execution of the six steps. The prospect of change can be daunting for many SME employees. Questions may arise about whether the impending change will adversely affect an employee's established working routines or whether the change will significantly reduce that employee's role.

Employee emotions and feelings such as fear, stress and a tendency to be objectionable or argumentative are some of the more common traits which must be overcome. The change agent (or team) must be aware that the key to overcoming these apprehensions is support. Employees may be sceptical regarding the impending change programme. This scepticism can manifest itself in the form of questioning the merits of change. Being openly opposed to the merits of the change programme, employees may cite previous (failed) attempts at IS introduction. Employees may also feel it appropriate to talk with other employees, rather than approach management or the change agent with any concerns, often exacerbating their fears in the process.

Core competency, or the aptitude and proficiency of organisational members, can be used to measure the acceptance or rejection of activities or behaviour of an organisational member. Competence can therefore indicate the cultural bearing of the organisation. The schematic depicts a distinction between the cultural and structural/organisational contexts. Six "discs" of cultural change straddle the dividing line between the cultural and organisational contexts. The change steps (IT pilot schemes, communication, education, facilitation, mentoring and dissemination) embrace and impact on both cultural and structural change. These six steps will now be discussed.

STEP 1-PS: PILOT SCHEMES

The research has shown that the use of IT pilot schemes greatly enhances the chances of user participation for the full MIS implementation. Pilot schemes allow the change agent to perform an "implementation test" with organisational members. The change agent is provided with the opportunity to appraise people's attitudes and aptitudes regarding IT and the change programme in general. Extending existing Information Systems, or introducing small projects, in this manner acclimates those users who may be technophobic. Additionally, this step can identify functions required by the MIS. The change agent should be prepared to execute a "hands-on" approach during

implementation of pilot schemes which demonstrates a commitment to IT and IS implementations.

STEP 2-CM: COMMUNICATION

The change agent should be aware that communication with all employees affected by the incoming MIS is of vital importance. Conversations should be pitched at an appropriate level, using non-technical terminology with technophobic personnel. Putting employees at ease and assuring them that comments would not be reported to management greatly encourages proactive and genuine debate. Constant encouragement such as this can elicit valuable opinions on the change programme and the MIS.

STEP 3-ED: EDUCATION

To expedite progress of the project, IT training (first encountered in Stage 2) should be continued. Imparting technical knowledge and skills allows users to participate fully, particularly during staged implementations. If the necessary technical abilities or training abilities are unavailable in-house, the organisation (via the MISCO Support Team or the MISCO Management Committee) should arrange for an external agent or organisation to convey the merits of the new system.

STEP 4-FC: FACILITATION

The research demonstrates the need for an internal change agent or change management team. The intrinsic nature of a SME means that external consultants, be they associated with change programmes or not, can be treated with suspicion. Employees may question the validity of external assistance, arguing that the organisation already possesses sufficient expertise. The research shows that constant reassurance is an integral part of the change process. The internal change agent (or facilitator) should constantly monitor, control and evaluate progress of the MIS implementation.

STEP 5-DS: DISSEMINATION

Disseminating the benefits of MIS and the success of IT pilot schemes throughout the organisation is of vital importance. The success and benefits of these schemes and implementations will assist sceptical employees. Pertinent decisions, outcomes and proceedings from meetings involving the MISCO Support Team and the MISCO Management Committee should be promulgated throughout the organisation. This may be appropriate through the use of team or department meetings, memos or emails.

STEP 6-MN: MENTORING

The change agent should be prepared to guide and monitor employees regarding their perceptions or resistance towards technology and the MIS. One-to-one discussions can alleviate such fears and change agents should, via organisational dissemination, ensure that employees are fully aware that mentoring opportunities are available. Some employees may be reluctant to voice their fears or concerns in front of their peers or department heads. It is vital that all employees give full support to the MIS implementation and it is therefore important that all concerns are alleviated.

GUIDELINES

Concurrent tasks and activities. The MISCO model, as part of its fundamental precepts, emphasises the need to execute tasks and activities concurrently. Sequential tasks increase the overall time taken to complete activities. This decrease in productivity can also lead to decreased motivation, again impacting on productivity. The MISCO model depicts the need to carry out the "six discs" (IT pilot schemes,

communication, education, facilitation, dissemination and mentoring) of cultural change concurrently. It is reiterated that the schematic does not suggest that activities are to be executed sequentially.

Introduce improved communication methods. Information exchange can be carried out either synchronously (interacting at the same time, for example a telephone conversation) or asynchronously (interacting at different times, for example exchange of emails). Experiences from Thermo-X and discussions with the external organisations suggest that asynchronous communication can be more effective than synchronous communication. Synchronous communication often means an inefficient use of time. Asynchronous communication can be improved by the use of group or departmental notice-boards, "active" trays and the exchange of email. Use of these methods allow users to think and debate key issues before responding, rather than giving an ill-informed "knee-jerk" response to questions.

Central data store. As discussed, outcomes and issues from MISCO team meetings should be properly documented and recorded. Data stores can either be paper or computer-based. It is suggested that one of these two methods is used, but not both. Use of more than one data store for the same type of data can cause inconsistency problems. Such problems can have an impact on productivity and team motivation. The research experience demonstrates that unclear, out-dated data leads to a large number of inconsistency problems. These problems often lead to data integrity errors, causing yet more problems for the organisation.

Reduction of information flows. Organisational efficiency should not be at the expense of organisational effectiveness. Information flows within MISCO should be relevant and concise. The presence of too much information can lead to confusion, stress and incorrect dissemination of activities and information. The role of department managers within the MISCO model has been well defined. Excessive information dissemination impacts on the role of department managers who then also assume a "messenger"-type role, providing (incorrect and unnecessary) information to department members. The use of electronic databases and effective filtering techniques can assist the elimination of excessive data and information.

Reducing control. The MISCO model encourages employee empowerment as the research has shown that this increases productivity and motivation for the MIS. Excessive control can severely reduce motivation and enthusiasm for the change programme. Without empowerment, responsibility for checking work and reports is then borne by departmental and top-line management, increasing workload. Additionally, employees become aware that these reports are to be checked by their managers which can lead to a slovenly approach to their work.

Limited number of contact points. The MISCO model encourages interaction between team members and departments. This interaction will involve contact between the change agents, employees, department managers and top-line management. The research has shown that contact points can generate delays and inconsistencies. Where excessive, this can lead to organisational dissatisfaction and a reduction in motivation.

Simplifying complex tasks and activities. Intricate and complex tasks, activities and processes should, where possible, be simplified into simpler ones. Simplification fosters motivation, increases clarity and reduces workload for employees. Confusion and mistakes are reduced when clarity and full understanding is achieved. Decomposition of tasks

and activities assists management in the monitoring, control, co-ordination and evaluation of these processes. Simplification of tasks can enable the change agent to work on various processes simultaneously.

Analysis and Evaluation

Having carried out the culture and organisation change steps in Stage 3, the model attempts to move to the next stage. Before doing so however, the effects of the six steps are appraised and evaluated. If it is felt that the effects of change have not been sufficient or if instigated changes have not been established, this is indicative of an ineffective change program. Deficiencies of the organisations or of the culture-organisation change process should be noted and the facilitator, following the feedback line, should return to Stage 2 (IT Training and Education).

GUIDELINES

Returning to Stage 2 should not be regarded as a major organisational (or a personal failing on part of the facilitator). Changing organisational culture and employee attitudes is a very difficult process. If the Analysis and Evaluation phase does confirm inadequacies of the change programme, these should be regarded with a positive attitude as the opportunity is then present to resolve these issues before they can be exacerbated.

Stage 4: Acceptance

If the Analysis and Evaluation phase does not identify any inadequacies, the model moves to Stage 4 (Acceptance). This stage is reached when cultural and structural change methods have been successfully deployed within the organisation.

GUIDELINES

The facilitator should be aware that, in this stage, acceptance is a state reached when, and only when, analysis and evaluation has been properly - and honestly - executed.

Stage 5: Stability

Having reached the Acceptance stage, re-entering the cultural barrier if necessary to resolve any difficulties, the MISCO framework takes an evolutionary route to the Stability stage. The route to this stage should be supported by continued mentoring and facilitation, elements already displayed and conveyed by the change manager. Although nearing the final stages, the transition between the Acceptance and Stability stages should not be executed complacently. Only when full Stability has been achieved should the change-manager be sure that his work is complete.

GUIDELINES

The facilitator should be aware that the stability stage may, with time, feedback to the recognition phase (Stage 1). Documentation of key stage activities should be continued at this point. It is recommended that a handover report be generated so that another change agent can be made aware of previous change-management issues within the organisation.

Re-Evaluation, Revision and Re-Entry feedback

Having achieved the objective of attaining a new culture, (a culture which has successfully accommodated a MIS and which has made appropriate changes to organisational structure), the organisation may, given time and experience, return to our original starting position. This position was one where the management of the

organisation have recognised that a culture and organisation change may be necessary.

The Empowerment Arrow: Organisational and Structural Change

The entire MISCO involves a desired move from an autocratic organisational structure to a more autonomous structure. The research confirms that this should be carried out by empowering employees to take increased responsibility and a more proactive role in their everyday tasks. The presence of the "empowerment" arrow seemingly to a point external from the main model should not nullify its importance to the MISCO framework.

GUIDELINES

The research originally conceptualised a shift from the organisational "temple" model to a "matrix" structure. The more realistic depiction of a move from an autocratic arrangement to a more autonomous structure, without the regimented labelling of "temple" and "matrix", reduces pressure on the MISCO Support Team and the MISCO Management Committee.

The importance of Core Competency

Views of McAuley [1994] and Bate [1990] are reflected in the framework. Competency, the aptitude and proficiency of organisational members, can be used to measure the acceptance or rejection of activities or behaviour of an organisational member. Competence can therefore indicate the cultural bearing of the organisation. The importance of the link between organisational culture and core competency is brought sharply into focus by McAuley's [1994] comment that if certain *competent* organisational members and a *core cultural component* are at odds, the same behavior that was once considered "competent" can now be incompetent. As a result of this association, the inclusion of core competency has an important role to play in the new MISCO Model.

Conclusion and Implications

Culture change is often necessary when implementing far-reaching Information Technology programmes into SMEs. The anticipated benefits of IT implementations must be offset with the operational-procedure changes necessary to both initially receive and successfully accommodate the new technology. This paper has established the cultural and organisational aspects of implementing a Management Information System into a UK-based SME, has formulated an innovative implementation framework which such a firm could use to implement a MIS and has analysed and considered the role and importance of management during the change process.

Organisational and cultural changes can be a key inhibitor or facilitator to successful implementation. However, attempting to change an organisation's culture is far from easy. The change process is riddled with a variety of challenging barriers which must be overcome in order to change the culture. Recognising and acknowledging the existence and complexity of these difficulties is central to the change process as, without this recognition, cultural and structural change will meet with failure, as will the anticipated benefits of the IT implementation.

The new Model has been put forward to present novel variables regarding Organisational and Cultural attitudes when implementing Management Information Systems. The Model requires empirical verification and validation upon which further work can be based in order to expand on the ideological concepts presented. Triangulation techniques [Taylor & Bogdan, 1984; Gummesson, 1988; Stake, 1995] can continue and be extended. Quantitative data techniques, perhaps in the form of detailed questionnaires, can be used to further validate the research findings.

The focus of this research has been on UK-based SMEs operating in a manufacturing environment. Opportunities may exist to expand on this by applying and refining the MISCO Model in other industries, such as service and retail, in order to form either a generic framework or specific model for these industries. The complexity of culture has been discussed within this paper. The applicability and validity of cultural identity and semantics results in varying definitions of culture. It is suggested that applying the MISCO Model to companies outside the UK (perhaps in Europe and the United States) would require a major re-evaluation of the conceptual constructs. Immersion in and experience from these different cultures may well result in a different MISCO Model.

It is now up to academics and IT practitioners to use the proposed MISCO Model, either in its existing form or after modification, in order to exploit its usefulness to UK-based SMEs.

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CHANGING ORGANIZATIONAL CULTURE FOR SUCCESSFUL MIS IMPLEMENTATION: A CASE STUDY

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The management area of organizational culture is an increasingly popular topic but, to date, empirical research applying the constructs to the small to medium sized enterprise (SME) sector has been slight. This paper attempts to rectify this by examining the relationship between organizational culture and management information systems (MIS) by way of an extensive case-study. The study will further analyze how organizational cultures are created and sustained in UK-based SMEs, how founders and leaders can influence the culture and will further investigate the role of organizational culture when implementing MIS.

The Case Study. This ethnographic study examines organizational culture at "Thermo-X," a pseudonym for a Derbyshire-based (UK) company that designs, manufacture, and calibration of thermocouples, resistance thermometers, and special purpose instruments. Originally formed in 1979, Thermo-X employs 30 staff and, at the time of writing, turnover stands at £1 million per annum with gross profits around 20%. Inventory levels remain high at £200,000 mainly due for the need to keep relatively large stocks of raw material in order to respond quickly to customer demands. Main competitors are all locally-based but compete nationally and internationally.

Thermo-X Organizational and Cultural Issues. This section will address the needs of managers at Thermo-X, be they at a junior, senior or assistant level. All of the managers at Thermo-X have progressed through a traditional "bottom-up" approach, starting at a relatively low "rung" in an organization (not necessarily Thermo-X). Proportionately little focus has been directed at these managers who may never have received formalized training in supervision and management. Those who may have received some form of training may be more suited to working in much larger organizations where formalized "tiers" of management and responsibility exist.

As a consequence, many managers at Thermo-X are ill-equipped to competently cope with and control the growing, and possibly conflicting, needs of a SME. This then impacts on their ability to effectively cope with Thermo-X's needs for efficient internal communication and appreciation of the need for change whilst adhering to the MD's corporate aspirations. Monthly management meetings, held from January 1996 to April 1997, began to reap benefits in improved communication and debate.

These meetings encompassed the quality precepts of quality circles, team meetings, brainstorming sessions and explained the importance of employee empowerment. Depictions of management and organizational structures, which had never previously existed, were used to great effect when explaining to shop-floor staff the impact of any changes on their departments or daily working practices. An additional problem concerned non-adherence to any computer system and the procedures and discipline required by these systems. Certain managers would be inclined to follow old, familiar, procedures rather than learn and practice the new systems. This "in-built" response to certain duties was inherent in the culture in order to carry out their tasks quickly and effectively.

The introduction of information technology (IT)—by way of the MIS and contemporary IT and IS techniques such as Internet, email and Windows-based packages—into Thermo-X has considerably altered the MD's role within the organization. The data and information produced by the IT, such as financial data highlighting inefficient areas of the company, has enabled the MD to focus his attentions elsewhere within the Thermo-X organization.

Changing the Thermo-X Organizational Culture. This section will discuss how the Thermo-X culture was changed in preparation for the incoming MIS. Other researchers agree that organizations attempt to change their culture in order to bring about a strategic change such as the introduction of a Management Information System. Due to the numerous and varied definitions of culture, it is conceivable that attempting to change organizational culture according to one researcher's model may be significantly easier than using another researcher's framework. The very diversity of the culture-change models illustrates their respective weaknesses in addition to their intended strengths. Given that the various models have provided great insights into the culture change process, the highlighted concerns should be explored further.

Changing the Thermo-X Culture, the Issues. Before discussing the culture-change activities, it would be useful to list the many different technical, organizational, theoretical, psychological and managerial issues considered. These issues revolved around my perception that I was to be the "driver of change" and not the technology. This personal view allowed the authors to realize that the key issues to consider were the:

1. Business circumstances of the organization, and the emergence of new task requirements
2. Impact of the organization's structure and the existing procedures, practices and systems
3. Design of jobs in relation to new tasks
4. Skills of managers and plans for training and staff development
5. Attitudes, motivation and commitment of all employees
6. Value-system of the company
7. Nature of the process for developing and updating the technology used by the organization
8. Design methodology and project management, the composition and effectiveness of any project team
9. State of industrial relations

With these issues and "new" job requirements in mind, various culture-directed activities were carried out in order to engineer the culture in preparation for the impending IT overhaul:

1. Diagnostic activities
2. Team-building and process consultation
3. Introducing more efficient technology
4. Extending existing information systems

Discussion. The thirty-month involvement with Thermo-X has demonstrated that the organization is run under the sole leadership and direction of the MD. Furthermore, it was the consensus of opinion of employees that, in order for the firm to grow, the culture and internal organizational procedures must be changed especially if the major IT project is to fully succeed. The ethnographic experience and a refined conceptual model was applied to the IT project being carried out at Thermo-X. Any change in organizational culture and structure would effectively be MIS-led, as the technology would act as the catalyst for change.

CONSIDERING CULTURE: THE MISCO MODEL FOR MIS IMPLEMENTATIONS IN SMES

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Information technology (IT) has made a prolific impact both in sociological and commercial terms. In the business world, the pursuit of new technology and working practices has often been at the expense of equal regard for the correct methods to manage the new technology. Contemporary IT techniques and methods include management information systems (MIS) which are normally implemented on a company-wide basis. However, MIS implementation has major cultural and organizational implications that will form the main focus of this paper. A conceptual model is proposed for successful MIS implementation combining established research findings with ethnographically-informed data from a small, UK-based, business. Ethnographically-informed data has confirmed that organizational culture change and a successful change program possesses several common precepts: the existence of an initial crisis, the importance of a strong leadership, emphasizing the importance of success and relaying news of the success and the importance of supporting change. The proposed MISCO (Management Information System Culture-Organization) model incorporates various activities carried out at a small, UK-based, business in order to stylize the culture in preparation for the impending MIS implementation. MISCO involves a number of different stages and activities that will be described in desired order of execution.

Stage 1: Recognition. This initial stage identifies previous and current organizational and human resource problems. Given that most business processes can almost always be improved, identification in this first instance refers to both external and internal pressures. Research by others to UK-based small to medium sized enterprises (SME) reveals that they are likely to face a range of varied external pressures. These pressures, relevant to MIS implementation, may include such tasks as the replacement of legacy systems or the need to meet Y2K (Year 2000) compatibility, an important issue at the time of writing. These pressures may result in the organization changing the way its internal processes and procedures are carried out. Established culture-change authors agree that these changes almost always face resistance from staff within the organization.

Stage 2: IT Training and Education. The feasibility study from Stage 1 is used as a basis for identifying key areas of the organization where attitude, belief, and value change is necessary to fully implement the system. The feasibility study facilitates identification of the level and extent of IT training and education required. The research has shown that the use of an internal change agent greatly enhances acceptance of the change program. Stage 2 can be described as an IT preparatory stage which will be built upon with the constructs within Stage 3.

Stage 3: Cultural and Organizational Change. This stage consists of six steps which, if possible, should be carried out simultaneously. The research has shown that the SME culture and organization change-process is non-linear, hence the suggestion for simultaneous execution of the six steps. The research has revealed six steps which embrace and impact on both cultural and structural change: (1) Step 3-PS: Pilot Schemes, (2) Step 3-CM: Communication, (3) Step 3-ED: Education, (4) Step 3-FC: Facilitation, (5) Step 3-DS: Dissemination, (6) Step 3-MN: Mentoring

Analysis and Evaluation. Having carried out the culture and organization change steps in Stage 3, the model attempts to move to the next stage. Before doing so however, the effects of

the six steps are appraised and evaluated. If it is felt that the effects of change have not been sufficient or if instigated changes have not been established, this is indicative of an ineffective change program. Deficiencies of the organizations or of the culture-organization change process should be noted and the facilitator should return to Stage 2 (IT Training and Education).

Stage 4: Acceptance. If the Analysis and Evaluation phase does not identify any inadequacies, the model moves to Stage 4 (Acceptance). This stage is reached when cultural and structural change methods have been successfully deployed within the organization.

Stage 5: Stability. Having reached the Acceptance stage, the MISCO framework takes an evolutionary route to the Stability stage. The route to this stage should be supported by continued mentoring and facilitation, elements already displayed and conveyed by the change manager. Although nearing the final stages, the transition between the Acceptance and Stability stages should not be executed complacently. Only when full stability has been achieved should the change-manager be sure that his work is complete.

Having achieved the objective of attaining a new culture, the organization may—given time and experience—return to its original (pre-implementation) starting position. This position was one where the management of the organization have recognized that a culture and organization change may be necessary. The entire MISCO involves a desired move from an autocratic organizational structure to a more autonomous structure. The research confirms that this should be carrying out by empowering employees to take increased responsibility and a more proactive role in their everyday tasks.

Conclusion and Implications. The anticipated benefits of IT implementations in SMEs must be offset with the operational-procedure changes necessary to both initially receive and successfully accommodate the new technology. Organizational and cultural changes can be a key inhibitor or facilitator to successful implementation. However, attempting to change an organization's culture is far from easy. The change process is riddled with a variety of challenging barriers that must be overcome in order to change the culture. Recognizing and acknowledging the existence and complexity of these difficulties is central to the change process as, without this recognition, cultural and structural change will meet with failure, as will the anticipated benefits of the IT implementation. It is now up to academics and practitioners to use the proposed MISCO Model, either in its existing form or after modification, in order to exploit its usefulness to UK-based SMEs.

SUCCESSFUL TECHNOLOGY MANAGEMENT: CONSIDERING ORGANIZATIONAL CULTURE

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This paper acts as a literature review and uses relevant knowledge and theories in order to present the extent of understanding of organizational culture and Information Systems (IS) to date. The concepts of culture, organizational culture, organizational structure, cultural and organizational change mechanisms will be introduced. This will be followed by a review of the increasing role of information technology (IT) from both a historical and commercial perspective. The concept of a management information system (MIS) will be discussed and distinguished from other areas of IT and its application and impact to small businesses will be detailed.

Perhaps the most cited definition of culture is that of Hofstede who suggests culture as being the "collective programming of the human mind that distinguishes the members of one human group from those of another." We would, in basic terms, simply describe organizational culture as "an attitude that governs the way things are done in that organization." Extending the notion of culture into an organization leads us to the definition of organizational culture. Schein highlights the pattern of basic assumptions used by individuals and groups to deal with an organization's personality and feel which forms the basis of that organization's culture. Changing culture according to one researcher's model may seem significantly easier than using another researcher's framework. We have reviewed several cultural change models and direct the reader to the works of several change-management theorists.

Impact and Use of MIS. Some of the more major evolutionary steps of Information Technology took place in the 1950s with the United States leading the global transformation from the industrial to the information age. The acceptability however of the on-going changes was far from unanimous. A study conducted at that time by Garrity and Barnes indicated that only 9 out of 27 installations surveyed covered their initial operating costs. However, progress was being made on other aspects of the new technology and as cost, performance, and potential usage of the technology improved, acceptability began to replace the initial skepticism. According to Schultheis and Sumner, IT implementations in organizations occur for the following reasons: (1) to improve efficiency, (2) to improve effectiveness, and (3) to bring about transformation. As Schultheis and Sumner explain, the fast-moving strategies in modern organizations leading to the increasing needs of IT have clouded the area of MIS to the extent where, as Lucey says, there is "no universally accepted definition of a MIS and those that exist reflect the emphasis of the particular writer." Despite this, attempts to put forward a definition of a Management Information System as an "integrated structure of databases and information flows over all levels and components of an organization whereby the collection, transfer and presentation of information is optimized to meet the needs of the organization." Although we would agree with all of the definitions given in this section, we would suggest that, in a commercial environment, (and for the layperson), the purpose of IT for organizations is to provide the right information at the right time. The "value-chain," dividing an organization into value activities, (distinct activities—such as order processing, advertising, marketing—necessary in order to carry out day-to-day business), confirms our current, and increasing, reliance on information.

Discussion. This paper introduced the concept of culture, organizational culture, management, and managerial structures. A historical review of researchers' interests on organizational culture and Information Technology was detailed in order to highlight the importance of the relationship between these two disciplines.

ETHICAL ETHNOGRAPHY: IMMERSION AND THE ROLE OF ACCESS

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Researchers entering commercial environments are often faced with unfamiliar work patterns and may lack knowledge of the industry within which they are working. In the same manner, opportunities for academics to understand the complexities of a business are scarce. Overcoming barriers to access suitable empirical data and information is vital if the research conducted is to be of value. In this respect, physical immersion into the commercial environment under investigation can be beneficial.

This objective standpoint allows the researcher the opportunity to experience the dynamic feel of the situation, improving observational skills, providing valuable insights into the operations of the organization under investigation and contributing rich and pertinent data to an academic setting. Ethnography is a research methodology well suited to such first-hand investigation. This paper will focus on ethnographic immersion in the small to medium sized enterprise (SME) sector and will discuss the importance of ethical considerations and the difficulties of gaining access into this important sector.

Ethnography. Ethnographic fieldwork examines the problem for an extended period as a participant-observer. The researcher becomes an integral part of the organizational scenario in order to fully appreciate the possible ramifications. Van Maanen defines ethnography as a "written representation of a culture or selected aspects of a culture." The ethnographic approach was originally developed by anthropologists whose interest in society and culture resulted in extensive observation and, in some cases, integration into the society under consideration. Prolonged observation of an organization can benefit by supplementing recorded interviews with a physical layout of the organization, style and type of decor, attitudes and aptitudes of personnel and interactions on the shop floor and in the office. This "research journal" also records the researcher's feelings, reactions, and speculation of personnel. In this way, appreciation of the culture of the organization is formed, supported by informal chats with personnel.

Our experiences confirm that ethnographic fieldwork can at times be problematic and complex and yet remain a highly effective method of data collection. Immersion in the workplace environment means that the participant-observer must possess a plethora of political, social and ethical skills. Equipped with this skill-set, the researcher is ideally placed to gain the trust of fellow workers in the organizations whilst still retaining academic abilities to analyze, pursue and criticize.

Field notes should be written up soon after leaving the ethnographic environment without referral to a third party. Detailed description, often including schematics, are of paramount importance. The participatory nature of ethnography means that the objective observations of co-workers can be complemented by the subjective, and objective, experiences of the researcher. Our completed ethnographic notes include direct quotes from co-workers alongside with numerous anecdotes. Together, these observations form a realistic picture of the commercial setting and can effectively illustrate organizational dynamics.

There are numerous avenues through which access the commercial setting can be negotiated, including sponsorship by the host organization, canvassing, introduction by a friend or family member or previous vocational experience within the host organization. Gathering data in the SME environment may have implications for the organizational culture and attitudes in place. The ethnographic researcher may cause suspicion amongst his or her colleagues that, for

example, shop-floor data is being gathered as a semi-covert operation, the results of which will be discussed with Senior Management.

Research in organizations can raise several ethical concerns. Organizational observations can take one of two forms: overt observations which have been authorized and covert operations which are likened to sneaking around without permission. However, these ethical concerns can be dealt with; whilst deliberate deceit is not an ideal course of action, it has, according to Johnson, its merits and can be an important method in gaining access to the organization. Once the researcher has gained access, the true intentions of his or her presence can then be revealed. Research carried out by a consultant can be fraught with difficulties as access can be controlled by "gatekeepers" who may hold a vested interest in the results of the research program.

Issues such as whether to cite and disseminate examples of dangerous working practices, contraventions to Health and Safety issues, witnessing shoddy workmanship or theft are left to the conscious of the researcher. Revealing to co-workers the duality of the ethnographic role (as employee and researcher) may prejudice objective data collection. Co-workers may feel obliged to provide answers that match the researchers' expectations or which "toe the company line." Conversely, concealing the dual-nature of the role risks exposure to the true intentions of the project. Deceit of this nature risks exposure that can cause loss of trust, jeopardizing future assistance in the project.

Confidentiality can be offered as a solution where the data collected is worthy and important and if the company is hesitant to reveal its identity. Replacing the organizational name with a pseudonym (perhaps referring to it as a Small Engineering Firm or Company X) can be a suitable compromise. Ethnographic researchers should focus on their original intentions for entering the commercial environment. Emulating real life, the ethnographic experience can raise several ethical quandaries, each of which can be dealt with in different ways. It is beyond the remit of this paper to offer a generic solution to ethical issues as human nature would dictate that an acceptable solution for one individual would be regarded as unsuitable by another.

Conclusion. After overcoming the hurdles to access to such organizations, researchers are often faced with a multitude of issues (such as ethical concerns) which must be dealt with. Many research methodologies exist and good quantitative and qualitative methods can be used in parallel in order to investigate organizational behavior. It is left to researchers and managers to blend these two methodological facets in order to better understand and modify the actions of an organization.

Appendix F

Appendix F: MISCO Model
A User Guide for SMEs

The MISCO Model: A User Guide for SMEs

Introduction

The MISCO (Management Information System Culture-Organisation) Model comprises a set of activities and techniques to prepare and support SME organisations for MIS implementation. This chapter will take the form of a "user guide" for use in UK-based SMEs. The six main stages of the model will be documented, accompanied by suggested guidelines, both for the overall model and for individual stages.

MISCO Stages

MISCO comprises a group process for UK-based SMEs and, in this context, can be regarded as both a methodology and a process. MISCO can be broken down into six main stages, some of which can be broken down into several component activities. All stages consist of several multifarious, yet interrelated, activities.

Identification of the activities within these six stages, in addition to guidelines, tools and techniques to be used, is important in the interests of correct understanding and application. Identifying the personnel involved in all stages will also be of paramount importance. The activities involved in each of the stages can be summarised as follows:

- *Stage 1: Recognition*
- *Stage 2: IT Training and Education*
- *Stage 3*

Step 3 - PS: Pilot Schemes
 Step 3- CM: Communication
 Step 3 - ED: Education
 Step 3 - FC: Facilitation
 Step 3 - DS: Dissemination
 Step 3 - MN: Mentoring

- *Stage 4: Analysis & Evaluation*
- *Stage 5: Acceptance*
- *Stage 6: Stability*

Detailed descriptions of the above activities are provided in the section entitled "MISCO Stages and Activities", together with a discussion of the personnel involved. A schematic illustrating the MISCO constructs is provided in Figure 1. From Figure 1, it would appear that the MISCO model is a relatively simple process. Stages and Activities are linked in an "input-output" relationship. The relationships can be described as "input-output" as they are carried out in sequence. The relationships exist as inputs and outputs of their respective predecessors (ie. an output from one process or stage becomes an input for another). These same relationships may or may not be carried out by the same group of people.

The schematic, Figure 1, aims to conceptualise the change process. The aims and objectives of the schematic are to provide a clear and concise view of the MISCO change process. Feedback loops are shown where applicable. For example, whilst performing out the activities in Stage 3, SME members (after evaluation of progress made) may decide to return to Stage 2. Returning to Stage 2 at this point indicates ineffective or insufficient progress being made during Stage 3 (Pilot Scheme, Communication, Education, Facilitation, Dissemination and Mentoring).

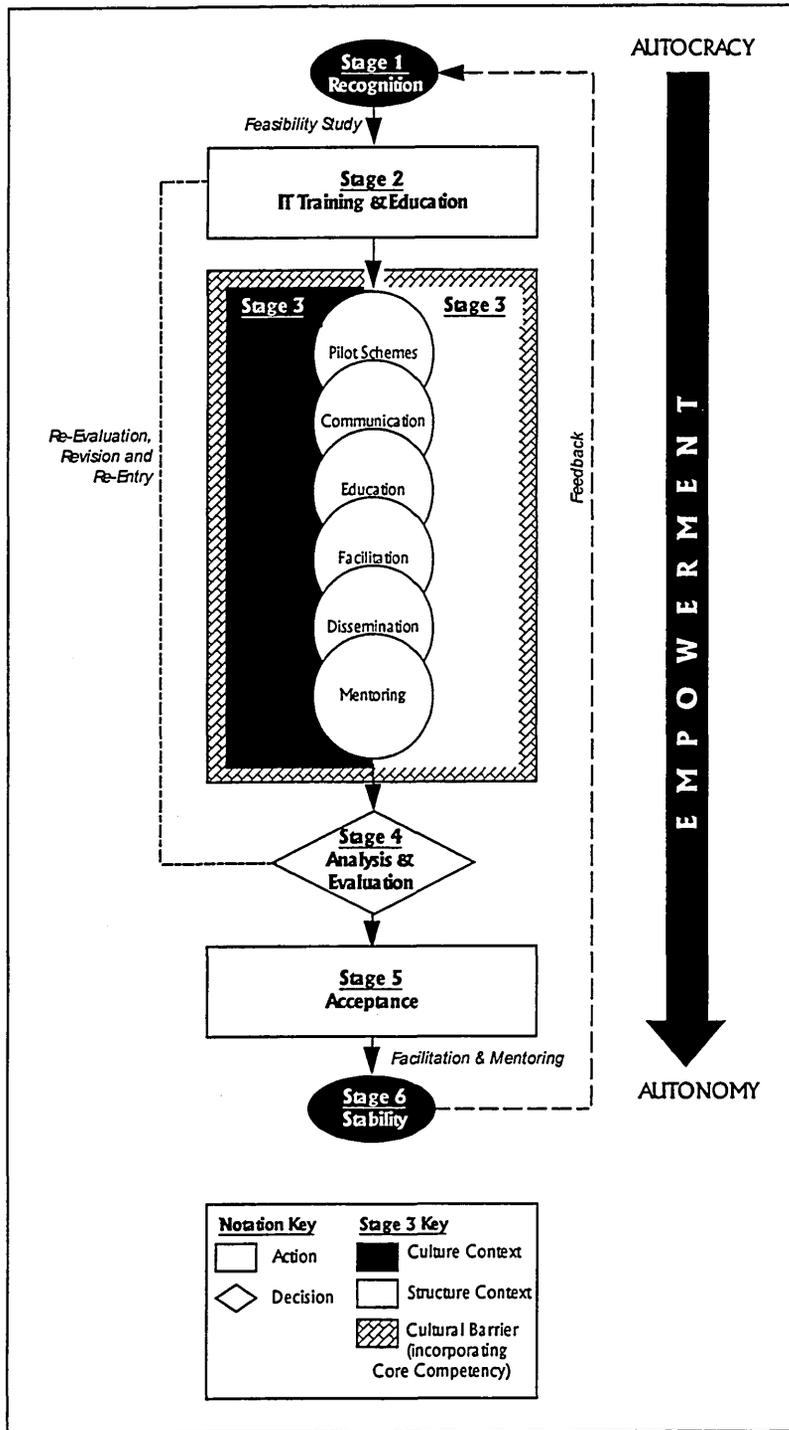


Figure 1: MISCO Model

Emulating established methodologies, such as PRINCE, it is recommended that the MISCO change process be split into two groups:

- MISCO Support Team
- MISCO Management Committee

The MISCO Support Team should consist of at least member, the facilitator. It is recommended that the MISCO Management Committee is a group of senior personnel (at the company and perhaps from external support organisations) who co-ordinate, support and oversee implementation and progression of the MISCO framework.

The MISCO Support Team is a group of personnel whose main function is to provide members of the SME with technical and organisational support and advice. The main function of the MISCO Support Team is to organise, document and carry out the inherent constructs of the MISCO framework.

The MISCO Management Committee is a body set up to control the development of the MISCO change process. The Committee has representation from various interested parties (such as company management and academic support). Typically, the Committee might have senior user representatives in addition to personnel from other departments (or departmental functions) such as accounts, purchase, HRM, sales and so on. The Committee should have the authority to make executive decisions on the MISCO project.

MISCO Organisational Roles

As discussed earlier, the MISCO change process should be carried out by at least two people, one of whom assumes the role of the implementor, the other should be a representative of top-line management.

The MISCO Support Team should co-ordinate the activities of the group and should interact with the MISCO Management Committee. Key responsibilities of the MISCO Support Team (or implementor) include:

- Scheduling meetings and ensuring that all necessary resources are available (eg. OHPs, flip-charts).
- Making contact with organisational (company) members and ensuring that they are able to take part in the group meetings (either in person or using an electronic medium such as email).
- Organising the documentation generated by group discussion and, after the meeting is finished, supplying the MISCO Management Committee with this documentation.

In the MISCO Support Team, the facilitator is responsible for summarising performance information about the change process and for highlighting opportunities for improvement. These responsibilities demand of the facilitator a thorough understanding of MISCO's criteria, guidelines, tools and techniques. However, the facilitator should not solely decide on the adoption of specific changes. This is a prerequisite of the MISCO model as changes and future directions should be obtained by group consensus.

The other members of the group should provide input, with executive decisions resting with the facilitator. In smaller organisations, it may be practicable for one person to play two or three roles, for example group leader, facilitator, and to provide inputs as a "group member". There is a danger at this point that objectivity will be lost.

MISCO Guidelines

Apart from the guidelines listed in the previous section, there are a number of additional guidelines which are relevant to the MISCO change process on a macro level. Such points are not necessarily associated with a particular stage or activity but are nevertheless an integral part of the framework:

- *Documentation.* The stages which the MISCO Support Team executes should be properly documented. The facilitator should possess full responsibility for documenting these processes as this historical data may prove to be of significance either in later stages or activities of the MISCO change process or in subsequent change programmes.
- *Linked Meetings.* Each meeting should, if possible, link to the previous meeting. An introduction to the meeting should link the main themes of the previous meeting (or meetings) with the aims and objectives of the current meeting. Each meeting should end with a summary of the main points which have been discussed. This summary can become the basis of the introduction for the next meeting. Such an approach can be justified in the interests of group cohesion and focus.

- *Group Cohesion.* Group "cohesiveness" (described earlier) is an integral part of the MISCO model. The facilitator should not use autocratic management methods to "enforce" such cohesion as this approach is contrary to that desired in MISCO.
- *Feedback.* The feedback loops shown in the MISCO model should be carried out in good time. Unduly deferring action (or re-action) endangers cohesiveness and the overall impetus of the project. Conversely, not waiting for a sufficient amount of time may infer to the organisation a hurried or superficial implementation approach. Future research may indicate a desired time for implementation (or re-implementation).

MISCO flow chart notation and guidelines

The MISCO framework has been conceptualised using flow chart notation, the chief aim of which was to understand the relationship between the stages and activities. By doing so, a clear understanding of the MISCO change-process is achieved. The MISCO flow chart represents processes using ANSI standard flow chart symbols.

MISCO uses only four symbols: the Start/Finish ellipse, the Activity rectangle, the Decision diamond and the Flow arrows, depicted in Figure 2.

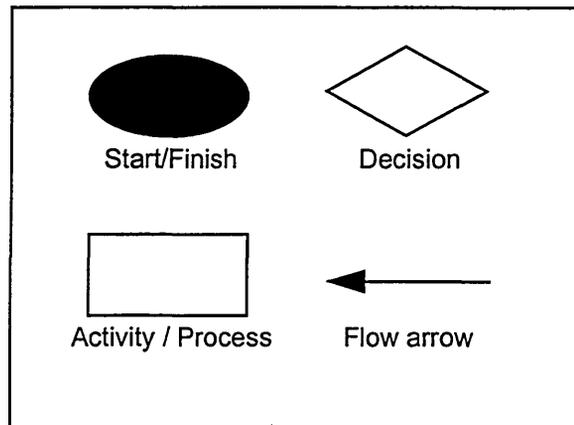


Figure 2: MISCO Flowchart notation

- *Start/Finish* - this symbol signifies the beginning or the end of a process or stage.
- *Activity* - represents an activity or stage of a business process. A brief description of the activity or stage is provided within this symbol.
- *Decision point* - at the end of certain processes, decisions may have to be made. Progression to the next stage or activity may depend on the outcome to the decision
- *Direction of flow* - used to indicate the direction of data or decision flows.

The MISCO schematic (Figure 1) is accompanied by a full narrative of the depicted stages and activities. Without this, information and understanding may be lost. Such information would not be appropriate for inclusion on a schematic but is invaluable for facilitating understanding of the model.

MISCO Stages and Activities

MISCO involves a number of different stages and activities. The following section discusses MISCO tools, techniques and guidelines appropriate for each stage and activity. Stages and activities will be listed in desired order of execution.

Stage 1: Recognition

In this first key activity, the organisation recognises that problems exist and these are identified. As discussed earlier, the facilitator should lead, motivate and co-ordinate the activities of the MISCO Support Team. This approach takes responsibility of problem identification away from the MISCO Management Committee.

However, the Committee should be encouraged to participate fully in these early stages, as previous knowledge of the organisation's history and previous organisational or industry experience of Committee members may be extensive and relevant to these initial discussions. Additionally, including the views of the MISCO Management Committee broadens MISCO's impact as it does not then rely on the initiative and experience of a limited number of managers.

This initial stage identifies previous and current organisational problems. Given that most business processes can almost always be improved, identification in this first instance refers to both external and internal pressures. Work by Lundberg [1985] has confirmed that many UK-based SMEs are likely to face a range of varied external pressures. These pressures, relevant to MIS implementation, may include such tasks as the replacement of legacy systems or the need to meet Y2K (Year 2000) compatibility, an important issue at the time of writing.

These pressures may result in the organisation changing the way its internal processes and procedures are carried out. Established culture-change authors [Lundberg, 1985; Schein, 1990; Dyer, 1985; Gagliardi, 1986; Lewin, 1952] agree that these changes almost always face resistance from staff within the organisation.

The experiences from Thermo-X and from the external organisations show that, in addition to identification of external pressures, identification of sources of discontent within the company should also be encouraged. It is recognised that these additional problems can enhance the level of motivation among organisation members. This also allows group members to have a clear view of what is to be achieved using MISCO.

A list of identified pressures and problems should be internally checked (by the MISCO Support Team) and then submitted to the MISCO Management Committee for additional verification and validation. The final version of the list should form the basis of the MISCO Support Team and the facilitator should assemble the Team by selecting and inviting prospective group members.

The list of problems should have a *focus*. This is because listing problems which are unrelated or which have an unnecessarily broad outlook can lead to the identification of several different, unrelated, avenues for change. The result of this could be to reduce the cohesiveness of the Team and Committee. The approach to problem identification should attempt to emulate that of "brainstorming".

All participants should be encouraged to suggest problems, no matter how minute they may appear. No one person's ideas should be ignored or belittled. Once a list (labelled as the "Feasibility Study" on the schematic) has been drawn up, work can begin on prioritising this list.

Internal and external pressures may cause the organisation to change the way its processes and procedures are carried out. Various authors [Lundberg, 1985; Schein, 1990; Dyer, 1985; Gagliardi, 1986; Lewin, 1952] agree that these changes may face resistance from staff within the organisation. Resistance to impending change may not always be of human origin as it may be the case that the existing physical infrastructure or internal working procedures within the organisation may be incapable of accommodating proposed changes.

GUIDELINES

- In this first stage, the MISCO Support Team and the MISCO Management Committee should garner opinions and views from all pertinent organisational personnel. It should be appreciated that this stage incorporates a feasibility study from which is generated a list of recognised issues. These issues should be prioritised, similar to the role of a Risk Register in project management. The Qualitative and quantitative data should be used in order to research and identify internal and external pressures.

Stage 2: IT Training and Education

The feasibility study from Stage 1 is used as a basis for identifying key areas of the organisation where attitude, belief and value change is necessary to fully implement the system. The feasibility study facilitates identification of the level and extent of IT training and education required. This training and education will then be used to penetrate the organisation's "cultural barrier" (discussed later).

This research has shown that the use of an internal change agent greatly enhances acceptance of the change programme. Stage 2 can be described as an IT preparatory stage which will be built upon with the constructs within Stage 3.

GUIDELINES

- The MISCO Support Team and the MISCO Management Committee should, with reference to the feasibility study, clarify which organisational member will participate in the proposed change process. If these members require assistance and support from higher management levels (or external organisations, eg, for training), this should be clearly stated.

Stage 3: Cultural and Organisational Change

This stage consists of six steps which, if possible, should be carried out simultaneously. Note that the schematic does not suggest that these activities are executed sequentially. The overlap of the six "discs" of change are present to suggest sequential activity. The research has shown that the SME culture and organisation change-process is non-linear, hence the suggestion for simultaneous execution of the six steps.

The prospect of change can be daunting for many SME employees. Questions may arise about whether the impending change will adversely affect an employee's established working routines or whether the change will significantly reduce that employee's role.

Employee emotions and feelings such as fear, stress and a tendency to be objectionable or argumentative are some of the more common traits which must be overcome. The change agent (or team) must be aware that the key to overcoming these apprehensions is support. Employees may be sceptical regarding the impending change programme. This scepticism can manifest itself in the form of questioning the merits of change. Being openly opposed to the merits of the change programme, employees may cite previous (failed) attempts at IS introduction. Employees may also feel it appropriate to talk with other employees, rather than approach management or the change agent with any concerns, often exacerbating their fears in the process.

Core competency, or the aptitude and proficiency of organisational members, can be used to measure the acceptance or rejection of activities or behaviour of an organisational member. Competence can therefore indicate the cultural bearing of the organisation. The schematic depicts a distinction between the cultural and structural/organisational contexts. Six "discs" of cultural change straddle the dividing line between the cultural and organisational contexts. The change steps (IT pilot schemes, communication, education, facilitation, mentoring and dissemination) embrace and impact on both cultural and structural change. These six steps will now be discussed.

STEP 3-PS: PILOT SCHEMES

The research has shown that the use of IT pilot schemes greatly enhances the chances of user participation for the full MIS implementation. Pilot schemes allow the change agent to perform an "implementation test" with organisational members. The change agent is provided with the opportunity to appraise people's attitudes and aptitudes regarding IT and the change programme in general. Extending existing Information Systems, or introducing small projects, in this manner acclimates those users who may be technophobic. Additionally, this step can identify functions required by the MIS. The change agent should be prepared to execute a "hands-on" approach during implementation of pilot schemes which demonstrates a commitment to IT and IS implementations.

STEP 3-CM: COMMUNICATION

The change agent should be aware that communication with all employees affected by the incoming MIS is of vital importance. Conversations should be pitched at an appropriate level, using non-technical terminology with technophobic personnel. Putting employees at ease and assuring them that comments would not be reported to management greatly encourages proactive and genuine debate. Constant encouragement such as this can elicit valuable opinions on the change programme and the MIS.

STEP 3-ED: EDUCATION

To expedite progress of the project, IT training (first encountered in Stage 2) should be continued. Imparting technical knowledge and skills allows users to participate fully, particularly during staged implementations. If the necessary technical abilities or training abilities are unavailable in-house, the organisation (via the MISCO Support Team or the MISCO Management Committee) should arrange for an external agent or organisation to convey the merits of the new system.

STEP 3-FC: FACILITATION

The research demonstrates the need for an internal change agent or change management team. The intrinsic nature of a SME means that external consultants, be they associated with change programmes or not, can be treated with suspicion. Employees may question the validity of external assistance, arguing that the organisation already possesses sufficient expertise. The research shows that constant reassurance is an integral part of the change process. The internal change agent (or facilitator) should constantly monitor, control and evaluate progress of the MIS implementation.

STEP 3-DS: DISSEMINATION

Disseminating the benefits of MIS and the success of IT pilot schemes throughout the organisation is of vital importance. The success and benefits of these schemes and implementations will assist sceptical employees. Pertinent decisions, outcomes and proceedings from meetings involving the MISCO Support Team and the MISCO Management Committee should be promulgated throughout the organisation. This may be appropriate through the use of team or department meetings, memos or emails.

STEP 3-MN: MENTORING

The change agent should be prepared to guide and monitor employees regarding their perceptions or resistance towards technology and the MIS. One-to-one discussions can alleviate such fears and change agents should, via organisational dissemination, ensure that employees are fully aware that mentoring opportunities are available. Some employees may be reluctant to voice their fears or concerns in front of their peers or department heads. It is vital that all employees give full support to the MIS implementation and it is therefore important that all concerns are addressed.

GUIDELINES

- *Concurrent tasks and activities.* The MISCO model, as part of its fundamental precepts, emphasises the need to execute tasks and activities concurrently. Sequential tasks increase the overall time taken to complete activities.

This decrease in productivity can also lead to decreased motivation, again impacting on productivity. The MISCO model depicts the need to carry out the "six discs" (IT pilot schemes, communication, education, facilitation, dissemination and mentoring) of cultural change concurrently. It is reiterated that the schematic does not suggest that activities are to be executed sequentially.

- *Introduce improved communication methods.* Information exchange can be carried out either synchronously (interacting at the same time, for example a telephone conversation) or asynchronously (interacting at different times, for example exchange of emails). Experiences from Thermo-X and discussions with the external organisations suggest that asynchronous communication can be more effective than synchronous communication. Synchronous communication often means an inefficient use of time. Asynchronous communication can be improved by the use of group or departmental notice-boards, "active" trays and the exchange of email. Use of these methods allow users to think and debate key issues before responding, rather than giving an ill-informed "knee-jerk" response to questions.
- *Central data store.* As discussed, outcomes and issues from MISCO team meetings should be properly documented and recorded. Data stores can either be paper or computer-based. It is suggested that one of these two methods is used, but not both. Use of more than one data store for the same type of data can cause inconsistency problems.

Such problems can have an impact on productivity and team motivation. The research experience demonstrates that unclear, out-dated data leads to a large number of inconsistency problems. These problems often lead to data integrity errors, causing yet more problems for the organisation.

- *Reduction of information flows.* Organisational efficiency should not be at the expense of organisational effectiveness. Information flows within MISCO should be relevant and concise. The presence of too much information can lead to confusion, stress and incorrect dissemination of activities and information. The role of department managers within the MISCO model has been well defined. Excessive information dissemination impacts on the role of department managers who then also assume a "messenger"-type role, providing (incorrect and unnecessary) information to department members. The use of electronic databases and effective filtering techniques can assist the elimination of excessive data and information.
- *Reducing control.* The MISCO model encourages employee empowerment as the research has shown that this increases productivity and motivation for the MIS. Excessive control can severely reduce motivation and enthusiasm for the change programme. Without empowerment, responsibility for checking work and reports is then borne by departmental and top-line management, increasing workload. Additionally, employees become aware that these reports are to be checked by their managers which can lead to a slovenly approach to their work.

- *Limited number of contact points.* The MISCO model encourages interaction between team members and departments. This interaction will involve contact between the change agents, employees, department managers and top-line management. The research has shown that contact points can generate delays and inconsistencies. Where excessive, this can lead to organisational dissatisfaction and a reduction in motivation.
- *Simplifying complex tasks and activities.* Intricate and complex tasks, activities and processes should, where possible, be simplified into simpler ones. Simplification fosters motivation, increases clarity and reduces workload for employees. Confusion and mistakes are reduced when clarity and full understanding is achieved. Decomposition of tasks and activities assists management in the monitoring, control, co-ordination and evaluation of these processes. Simplification of tasks can enable the change agent to work on various processes simultaneously.

Analysis and Evaluation

Having carried out the culture and organisation change steps in Stage 3, the model attempts to move to the next stage. Before doing so however, the effects of the six steps are appraised and evaluated. If it is felt that the effects of change have not been sufficient or if instigated changes have not been established, this is indicative of an ineffective change program. Deficiencies of the organisations or of the culture-organisation change process should be noted and the facilitator, following the feedback line, should return to Stage 2 (IT Training and Education).

GUIDELINES

- Returning to Stage 2 should not be regarded as a major organisational (or a personal failing on part of the facilitator). Changing organisational culture and employee attitudes is a very difficult process. If the Analysis and Evaluation phase does confirm inadequacies of the change programme, these should be regarded with a positive attitude as the opportunity is then present to resolve these issues before they can be exacerbated.

Stage 4: Acceptance

If the Analysis and Evaluation phase does not identify any inadequacies, the model moves to Stage 4 (Acceptance). This stage is reached when cultural and structural change methods have been successfully deployed within the organisation.

GUIDELINES

- The facilitator should be aware that, in this stage, acceptance is a state reached when, and only when, analysis and evaluation has been properly - and honestly - executed.

Stage 5: Stability

Having reached the Acceptance stage, re-entering the cultural barrier if necessary to resolve any difficulties, the MISCO framework takes an evolutionary route to the Stability stage. The route to this stage should be supported by continued mentoring and facilitation, elements already displayed and conveyed by the change manager. Although nearing the final stages, the transition between the Acceptance and Stability stages should not be executed complacently. Only when full Stability has been achieved should the change-manager be sure that his work is complete.

GUIDELINES

- The facilitator should be aware that the stability stage may, with time, feedback to the recognition phase (Stage 1). Documentation of key stage activities should be continued at this point. It is recommended that a handover report be generated so that another change agent can be made aware of previous change-management issues within the organisation.

Re-Evaluation, Revision and Re-Entry feedback

Having achieved the objective of attaining a new culture, (a culture which has successfully accommodated a MIS and which has made appropriate changes to organisational structure), the organisation may, given time and experience, return to our original starting position. This position was one where the management of the organisation have recognised that a culture and organisation change may be necessary.

The Empowerment Arrow: Organisational and Structural Change

The entire MISCO involves a desired move from an autocratic organisational structure to a more autonomous structure. The research confirms that this should be carried out by empowering employees to take increased responsibility and a more proactive role in their everyday tasks. The presence of the "empowerment" arrow seemingly to a point external from the main model should not nullify its importance to the MISCO framework.

GUIDELINES

- The research originally conceptualised a shift from the organisational "temple" model to a "matrix" structure. The more realistic depiction of a move from an autocratic arrangement to a more autonomous structure, without the regimented labelling of "temple" and "matrix", reduces pressure on the MISCO Support Team and the MISCO Management Committee.

Conclusion

In this Guide, the roles of top-line management and departmental managers has been described. Emulating methodologies such as PRINCE, the chapter has split the MISCO process into two groups: the MISCO Support Team (consisting of at least member, the facilitator) and the MISCO Management Committee (a group of senior personnel who co-ordinate, support and oversee implementation and progression of the MISCO framework). The thesis suggests that the new, revised, MISCO model can be used to assist non-technical persons to appreciate the cultural, organisational and technical consequences of implementing a MIS into their SME.