THE DEVELOPMENT OF THE GIST (GROUNDING INFORMATION SYSTEMS) METHODOLOGY: DETERMINING SITUATED REQUIREMENTS IN INFORMATION SYSTEMS ANALYSIS

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FIGURES

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Declaration

This thesis contains reference to material by the author which has previously been published in conference papers. These are

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Hughes, J. and Burgess, C. (1995) 'Human resource management strategies and the changing rôle of the systems analyst' Proceedings of the Third British Computer Society Conference on Information Systems Methodologies. Wrexham. UK. pp. 131-140.

Hughes, J. and Reviron, E. (1996) 'Selection and evaluation of information systems methodologies: The gap between theory and practice' Proceedings of the Fourth British Computer Society Conference on Information Systems Methodologies. Cork. Ireland. pp. 309-320.

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ABSTRACT

This thesis develops a methodology for situated requirements determination in information systems analysis. The thesis challenges convention and adds to the body of knowledge in this area since the methods of the methodology are more usually associated with the social sciences. The rôle of the systems analyst and the nature of information systems as a distinct discipline form a major part of the thesis and the scope of this investigation includes an exposition of information systems methodologies in general and 'soft' methodologies in particular.

A major element of the thesis is the empirical work carried out in which the researcher has undertaken two 'live' systems analysis studies using the methodology which has been developed in action supported by computer software for qualitative data analysis The results from the study are presented in terms of learning and are analysed to help answer the questions relating to the appropriateness of the methodology and the usefulness of the methodology for practising systems analysts.

The research methodology used is action case and the appropriateness of this is examined in depth since studies of this type raise a number of questions relating to the validity of this type of research and the rôle of the researcher.

The thesis draws together the different problems and questions that arise in order to produce a coherent, consistent and academically worthy account based upon the literature and empirical findings. In short the thesis addresses the basic issue that motivated its production, namely, how systems analysts faced with organisational complexity really find out what is going on.

The outcomes of the research argue for a new rôle for the systems analyst as postmodern 'bricoleur' and tentatively propose the usefulness of social science methods in information systems practice.

CHAPTER ONE

THE AREA OF CONCERN

"A writer's problem does not change. He himself changes and the world he lives in changes but his problem remains the same. It is always how to write truly and having found what is true, to project it in such a way that it becomes part of the experience of the person who reads it" Ernest Hemingway.

1.1 Introduction and background

The purpose of this section is to give an overview of the ideas and problems which form the basis of the thesis. As with the research process this introduction moves from the general to the specific. Many of the ideas raised are dealt with in depth later in the thesis but it will suffice at this stage to give a flavour of what is to come.

The context of the thesis is Information Systems (IS) and it is therefore necessary to have an understanding of the nature of Information Systems as a discipline area and to arrive at a working definition of this term since even the use of the word 'discipline' is not without its problems. Jayaratna (1994) maintains that the emergence of IS as a discipline is largely due to the inadequacy of the computer science discipline to address the problems associated with the use of computers in organisational contexts. That is to say that the technology concerns rather than organisational concerns tend to drive the development and implementation of systems (Flynn, 1992; Gasson, 1995). In that sense then it may be said to be distinct from computer science, but it is insufficient to consider computer science as the only forebear. Adam and Fitzgerald (1996) consider the two major disciplines from which IS has emerged as being computer science and management science together with a host of supporting fields including: psychology; sociology; statistics; political science; behavioural science; economics; philosophy; mathematics. The result as Lewis (1994) notes is that

"The comparative youth of IS as a field of study means that its boundaries remain much debated and the means by which it may be studied are still emerging.....The field of IS has become a disorganised aggregate of ideas and theories from many different disciplines, some of which have incommensurable philosophical bases" (Lewis, p.3, 1994)

Because of this apparent confusion of definition Jones (1995) argues that IS is not a discipline and that the confusion arises because some authors treat discipline as a synonym for field or domain of study. The major stumbling block in definition appears to be whether it is sufficient to have the appropriate structures for the discipline such as academic journals, professorships, academies and the like, or whether the definition should be applied at a more philosophical level. In the latter case this would

"restrict the use of the term [discipline] to fields of study sharing a distinctive methodology or distinctive set of ontological and epistemological assumptions" (Jones, p.32, 1995)

and on the basis of this test, Jones argues, then Information Systems would fail. The implications of this are that if Information Systems is to become a discipline in both senses then those involved in IS research must follow two routes. Firstly to sustain the structures that support Information Systems and secondly to engage in quality multi-disciplinary research to establish a common philosophical basis for the discipline.

Adam and Fitzgerald (1996) maintain that the IS research is currently diverging by supporting a plethora of methodologies and approaches and they argue that

"....in situations where researchers cannot agree on the definition of the problems they attempt to address, there would be benefit in a clustering of the area into distinct camps where researchers can meaningfully exchange their research results. This clustering can remain until the accumulation of knowledge within each cluster is sufficient to raise first principles and enable constructive dialogue" (Adam and Fitzgerald, p.27,1996)

This divergence is particularly evident in the area of information systems development methodologies and not least because the approaches have been categorised as being either 'hard' or 'soft' with an inherent dualism between the two approaches. Hard methodologies are characterized as 'means ends' where the objective of IS development is to rationally develop an information system which satisfies some previously specified and objectively given set of requirements (Winograd and Flores, 1986). The soft approach is characterised by the presence of multiple perspectives and the requirements are constructed through a social process. Some methods attempt to combine the hard and soft approaches (Wood-Harper et al., 1985; Avison and Wood-Harper, 1990, 1991), others suggest an embedded approach (Miles, 1988; Savage and Mingers, 1996) and others, concerned with the underlying philosophies, seek to link hard and soft approaches by achieving a paradigm shift (Wood, 1992).

However this paradigmatic closure which leads to the dualism of hard and soft has been challenged by Walsham (1993b), Vidgen (1993) and Orlikowski and Robey (1991). It is suggested by these authors that the hard / soft dualism may be recast as a duality and it may therefore be possible to dissolve the boundaries between research traditions by

"emphasising not only the importance of subjective meaning for the individual actor, but also the social structures which condition and enable such meanings and are constituted by them" (Walsham, p.246,1993b).

Stressing the emphasis on the 'importance of subjective meaning' helps to provide a context for the thesis and a definition of information systems which is explored later in chapter 2

"An information system is any system which assembles, stores, processes and delivers information relevant to an organisation (or society), in such a way that information is accessible and useful to those who wish to use it, including managers, staff, clients and citizens. An Information System is a human activity (social) system which may or may not involve the use of computer

systems" (Buckingham et al. (1987) quoted in Avison and Wood-Harper, p.5, 1990)

It is from this context that the motivation for this study emerges. It is clear that information systems, whether a field or a discipline, has an eclectic heritage. The methods and methodologies which prevail relating to information systems development reflect this eclecticism. Indeed Wynekoop and Russo (1995) maintain that despite the plethora of IS methodologies which abound and the fact that deficiencies in methodologies are often cited as reasons for information systems failure there is little evidence of published systematic evaluations of methodologies in practice. Their literature search points out that there is little evidence to even suggest that IS methodologies are in fact used. This research study then aims to draw upon these calls for future research - namely: to provide an empirical study which builds on existing frameworks; to use methods which emphasize the importance of subjective meaning for the actors and also attend to the social structures which enable such meanings; to evaluate the practical value or usefulness of a proposed methodology. In order to achieve this, the study will concentrate on one area of information systems development, requirements determination, since this is the most organisation dependent phase (Flynn, 1992) and the processes and products vary enormously from organisation to organisation.

The study will draw upon practical analysis methods more usually associated with social science research and in particular the sociological research method Grounded Theory (Glaser and Strauss, 1967). Section 1.4 and 3.2 deal with this in some detail but briefly it is proposed that the systems analyst involved in the determination of requirements is in the rôle of social researcher. This is not a new concept in information systems. However previous attempts to link this rôle to action research studies using Soft Systems Methodology (SSM) (Checkland, 1981; Checkland and Scholes, 1990) whilst gaining popular appeal have been criticised from some quarters, notably Brown (1992) on the grounds that SSM is flawed as a mainstream sociological research approach and there are inherent weaknesses in the first two stages of SSM - the finding out stages - which,

" provides only the most impressionistic guidelines for the capture and analysis of data, and omits consideration of some important research questions" (Brown, 1992)

It is therefore suggested that Grounded Theory provides a method which gives rigour to the analysis of data since as Martin and Turner (1986) point out,

"...Grounded Theory has potential far beyond its use to date. When used with other methods designed to 'make manageable' seemingly unmanageable qualitative data ... and/or aid in the discovery useful and important concepts for subsequent research and development, Grounded Theory research in organisations can provide important concepts for the researcher's 'kit of tools' for making sense of - and improving - organisational reality" (Martin and Turner, 1986)

Later in the thesis the importance of a *rigorous* method of analysis will be explored since this becomes a cornerstone in determining the relationship between rigorous methods, relevance and context (Turner 1991a).

The selection of Grounded Theory amongst a myriad other qualitative analysis methods is not arbitrary but rather because it has been a dominant paradigm for social research. Little (1991) recognises that a Grounded Theory approach can help to build upon the existing SSM approach by both challenging and complementing it. It is this emphasis on extension rather than another new methodology which is key to the motivation of the study.

As shall be discussed later in the thesis, one major criticism of Grounded Theory is that it is a set of procedures and lacks an explicit sociological perspective. In practice this means that Grounded Theory is rigorous in the analysis of qualitative data but is not concerned with the how the data was collected. That is to say that its epistemological status is unclear. Therefore it is proposed that combining Grounded Theory procedures with an explicit sociological perspective such as that of ethnomethodology (Garfinkel, 1967) will secure the epistemological status of the method and will in fact constitute a justifiable methodology. The term 'perspective' is used to indicate a way of

viewing social life and the perspective of ethnomethodology is dealt with in section 1.4.2 and 3.1 but briefly it is concerned with descriptions of every day life (or organisational life) expressed in the words of the organisational members. Thus it can be considered to be useful in providing good quality data and also providing the ontological basis for the proposed methodology. Used in this way ethnomethodology becomes more than a perspective, it is a paradigm for inquiry and Grounded Theory provides the methods of analysis.

Finally, but none the less important is the rôle of the information systems analyst in the rôle of social researcher or as Walsham (1993a) describes, the analyst as moral agent The systems analyst as social researcher becomes involved in the domain under study and cannot be the neutral observer. This is quite removed from the more orthodox rôle of the information systems analyst as system expert which largely avoids human and organisational issues. It is closer to the view of analyst as facilitator as described by Hirschheim and Klein (1989) where the analyst is a consciously reflective agent.

A concern that permeates the study but is discussed in detail in chapter 4 is the presentation of action case as a research methodology not least because the researcher is in a scientific sense both a phenomenon or object of the study in addition to being the observer. Identifying the potential conflict of this situation helps towards an understanding of it but does not resolve the potential conflict. However it will be argued that the richness of the learning from such a position outweighs the disadvantages. Indeed one consolation is that those researchers undertaking action research in SSM studies have faced, and argued against, the criticism (Little, 1991).

Overall the contribution of this study will be its attention to developing an existing framework; re-defining the rôle of the information systems analyst; testing the efficacy of Grounded Theory and ethnomethodology in information systems practice; consideration of action case as a research methodology in information systems research. The next section aims to succinctly define the study by explicitly addressing the cohesion between the parts described here.

1.2 Statement of the area of concern

Figure 1.1. expresses diagrammatically the essence of the area of concern. The

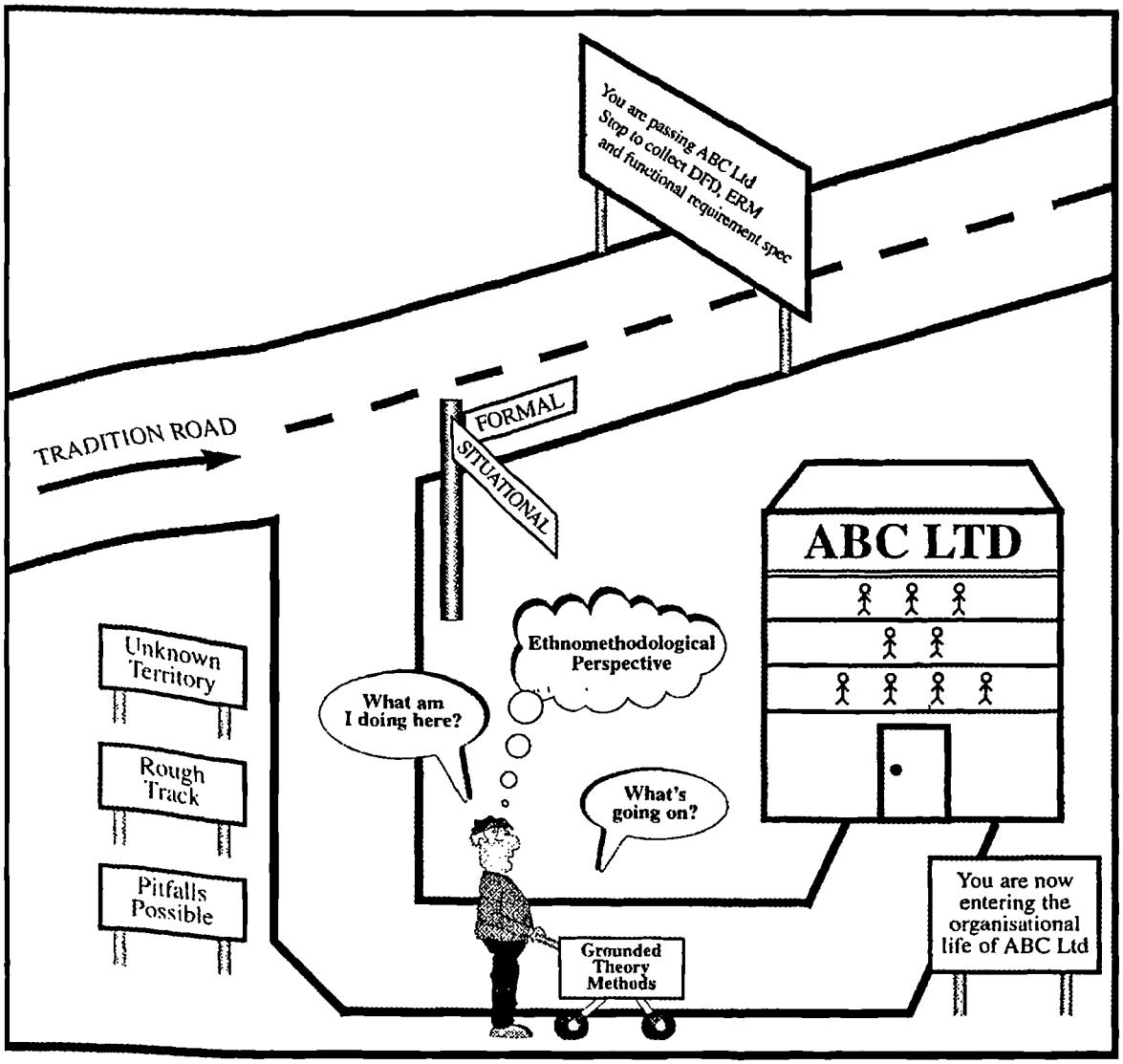


Figure 1.1 Diagrammatic representation of the area of concern

wider picture conveys a departure from tradition. The tradition suggests known methods and methodologies, a comfortable way forward which depends largely on traditional physical science to explain phenomena and where the concern is not for understanding organisations but more for capturing and holding those elements (requirements) of the organisation in order to construct some artefact (computer system). The depiction shows that the route which

this thesis takes is relatively unknown and also may contain pitfalls. However it is proposed that it is a richer route which brings the analyst into the situational aspects of the organisation. In the detail of the diagram is shown the sociological perspective of ethnomethodology held by the analyst as an overarching or philosophical basis for the forthcoming intervention. The Grounded Theory methods and procedures are depicted as the tools required to answer the question 'what is going on'? The other question 'what am I doing here?' represents the reflective practitioner consciously questioning motive and method in order to learn.

1.3 Research objectives

This section defines the area of concern in terms of expected outcomes and therefore also in terms of the expected contribution to the academic field. For clarity each contributory factor relating to the area of concern is dealt with separately. In the final chapter these objectives are revisited to help evaluate the extent that the study has been successful.

At the end of the study/thesis the author will have:

- Developed a methodology for intervention in the requirements determination phase of information systems analysis. The methodology will be based on methods and a perspective from the social sciences and an action case approach;

- Evaluated the use of Grounded Theory and the ethnomethodology perspective as the basis for requirements determination in information systems analysis. In particular the study will progress the understanding of the framework of ideas and the methodology through two iterations of the methodology in action. The expected outcome is that the framework and the methodology will be adapted through these iterations and thus a practical insight will be gained into the usefulness of the methodology which complements the theory presented in the literature search;

- Investigated the area of information systems methodologies in general through the literature. The empirical study will have developed a methodology for requirements determination and the learning that can be articulated from the empirical work will be used to complement or critique the existing literature. The result will be an informed evaluation of the methodology in the study in particular and a discussion relating to information systems development methodologies in general;

- Studied and evaluated the two broad approaches to requirements determination which may loosely be characterised by the formal requirements engineering approaches and the situationally based postmodern approaches. The empirical work will build upon the situational approaches such that insight can be given into the value of such approaches in requirements determination for information systems;

- Studied the rôle of the systems analyst from a historical perspective drawing upon research which enabled the rôle to be defined. This context will have enabled a fuller explication of the current rôle and a consideration of the rôle of analyst in the light of the proposed methods of analysis used for the study. In particular it is expected that an understanding of the rôle of the systems analyst with respect to the use of social science methods will be key to the usefulness of the proposed methodology.

1.4 Determining a conceptual framework

It is the purpose of this section to present an understanding of how the area of study relates to the associated theory. It begins with the calls for research of this kind and then develops by summarising the major theories and research which support and clarify the ideas. At the end of this section it will be clear how this research is situated in the context of surrounding theory and as a result identifies the motivation and importance of the study.

1.4.1 A call to research

This section identifies the need for such research by specifically considering authors and publications that have argued for a research agenda which is in harmony with the direction of this thesis. Fuller explication of the works of the authors mentioned here are covered in the literature reviews in chapters two and three.

In the proceedings of an IFIP Working Group 8.2 conference which met to consider the information systems research arena for the 90's, Nissen, Klein and Hirschheim (1991) call for a pluralist perspective of information systems research. They call for researchers to understand a range of research methods which necessarily includes extending that understanding such that the reliance on the traditional research methods of laboratory experiments, case studies and surveys does not persist. They argue that this methodological pluralism in terms of research methodologies leads to diversity and intellectual controversy but the greater outcome is that whilst a researcher may have a bias in selecting one research method it is selected in the knowledge of the others. In many ways it is this methodological pluralism that motivates the research set out in this thesis and it is methodological pluralism in terms of the methods selected for the empirical work that also motivates the work. As Hirschheim and Klein point out elsewhere (Hirschheim and Klein, 1989), it is methodological pluralism in practice which leads to interesting and creative solutions for systems analysts/developers. That is to say that by articulating underlying assumptions and understanding their own rationale or philosophy for action then systems analysts/developers actively and critically evaluate their work.

In this thesis a framework of ideas and a methodology for intervention are put into practice and evaluated and the resulting learning is used to inform further practice. This is done against an understanding of tradition and current practice rather than in some dogmatic way. The thesis does not intend therefore to challenge and dismiss tradition but rather to challenge and extend it.

This view of a reflective or moral agent is also stressed by Walsham (1993a) who considers that practitioners in information systems need to be critical and reflective and that if enough numbers were so then it could lead to positive societal changes. Clearly as Walsham notes it is not possible to consider the use of methods in practice separately from the practitioner and in this thesis there is explicit linkage of methods used and the analyst using them in order to provide the critical and reflective element which could lead to positive change. Jayaratna (1994) leads this discussion into the information systems methodology domain by defining methodology as,

"an explicit way of structuring one's thinking and actions. Methodologies contain model(s) and reflect particular perspectives of 'reality' based on a set of philosophical paradigms. A methodology should tell you 'what' steps to take and 'how' to perform those steps but most importantly the reasons 'why' those steps should be taken in that particular order." (Jayaratna, p.37, 1994)

In this thesis a methodology is proposed which as Jayaratna suggests articulates the underlying philosophy, the stages and steps and reflects on the 'why'.

For the particular methods involved in the methodology the thesis answers a call made by Goguen (1991) with respect to the field of requirements engineering in which he lays out why it is impossible to completely formalise requirements and that formalisation must be accompanied by situational information which can be determined only through the use of methods from the social sciences. More explicitly he points to the use of postmodern methods such as those based on ethnomethodology to elicit the emergent requirements of organisations.

Finally the importance of the research in terms of information systems is evident from the call for papers in Management Information Systems Quarterly (MISQ, 1995) which aimed to identify excellence in information systems research. The editors identify both action research and also the use of Grounded Theory as possible methods. Whilst this thesis proposes the use of

Grounded Theory as a method of practical analysis rather than a research method in a personal correspondence with one of the editors of MISQ she notes,

"I am intrigued by your project.....while the content of your paper is about GT [Grounded Theory] in an unusual context, the implicit goal is to try and convince other researchers that you've learnt something really important through the excellent use of AR [action research]" (Markus, personal communication, 1996)

1.4.2 The importance of the research

Having established the basis in research agenda for the need for studies of this type it is important to examine the theories which make this research relevant. In particular the following presents the arguments which lead the author to believe that the combination of an explicit sociological perspective and the use of known procedures in sociology for finding out what is going on in problem situations has a sound theoretical basis and may therefore be proposed as a potentially useful methodology in the requirements determination phase of information systems development. This theoretical basis or argument is presented elsewhere by the author in Dobbie and Hughes (1993).

Firstly the author maintains that there is a critical weakness in many of the methods employed in the requirements determination phase of information systems development since although the methods may have an underpinning philosophical basis, they are not explicitly embedded within any social scientific perspective. Such a perspective would enable methods or methodologies to address the organisational contexts in which their use may be envisaged. In other words, for information systems development purposes, traditional methods have been used which are based on a philosophical paradigm that is intended to give a technological perspective. In view of the directions from which many information systems researchers have arrived (Adam and Fitzgerald, 1996) it perhaps is not surprising that their ideas in the realm of organisational analysis may appear to some to be epistemologically unsound.

The issue here is that any analysis which aspires to reveal details of particular aspects of organisational life needs to reflect an ontological and epistemological rationale for the study of organisations as complex systems. That is to say, until it is decided what is knowable about organisations, and how such knowledge might be arrived at, the eclectic use of what may be labelled 'convenient' analysis instruments poses a threat to any serious progress. The fundamental question which must be addressed from the outset by an analyst, in any organisational or social setting, is 'what is going on?', or, more pointedly, 'how do I make sense of, and understand, what is going on?'

In the traditional inquiry methods analysts may bring assumptions into the organisational domain which may have little or no relevance to the context in which the questions are being asked. These assumptions may not be explicit and therefore may as a consequence never be examined. If for example analysts set out to discover why people hold particular points of view, or why people in a particular part of the organisation behave in a certain way then they must first be able to explain why such a discovery is important or relevant. It is against this background that the issues are addressed.

Soft Systems Methodology (SSM) (Checkland, 1981; Checkland and Scholes, 1990) is one of the most widely known methodologies which directly addresses the worldviews of actors in the 'finding out' stage. Brown (1992) refers to the inherent weaknesses in the first two stages of SSM which he says seems to arise both from the lack of an explicit ontology and, largely as a consequence of this, an absence of any epistemological parameters. As noted by Dobbie and Hughes (1993), this has opened the door to possible expediency in the application of inquiry methods and methodologies. That is to say that in the worst case analysts may use methods and methodologies in the organisational domain without regard to any underpinning philosophy. Dobbie and Hughes (1993) suggest that it might prove useful to employ an explicit ethnomethodological perspective or more correctly a Realist ethnomethodological perspective as proposed by Silverman (1985) in order to as he says 'correctly situate' the epistemological status of the knowledge

obtained from the finding out process. Although it may be argued that Silverman does not appreciated the nature of a sociological paradigm when he suggests 'correct' his treatment of Realist ethnomethodology is interesting. This treatment combines a traditional interactionist perspective with an ethnomethodological approach. The former treats qualitative data as a possible window upon another reality, for example of the social actors concerned, in which organisations may be characterized by, and understood as, constellations of meanings which are subjectively and inter-subjectively arrived at, negotiated and sustained. Taken alone, interactionism requires rigorous methods of inquiry in order to ensure validity. The latter, the ethnomethodological approach, treats qualitative data, particularly interview data (Cicourel, 1964), not as a resource, but as the research topic itself. In other words ethnomethodologists see actors' accounts and the practices they employ in rendering accounts as the only accessible reality. Thus ethnomethodology requires rigorous analysis of the data. In combining the two approaches Silverman (1985) suggests that actors' accounts may be seen as 'displays of reality'. The sole imperative in using a Realist perspective is that all of the data collected, in its raw state, consist of original accounts rendered by the actors' themselves. Silverman's view of ethnomethodology may be considered to be more practical in terms of the use of ethnomethodology as a paradigm for inquiry since it leads to the possibility of the data collection, or accounts generated, being subsequently analysed and not merely accepted as both the collected data and the analysed data. This pragmatic position with respect to the perspective of ethnomethodology is discussed in some detail later in section 3.2. So far then questions of validity regarding the collection of data become less problematic, and the issue of reliability hinges upon the form of analysis of the data.

It is possible to address this issue by adopting an appropriate set of methods for data analysis. The Discovery of Grounded Theory is such a set of methods. The Discovery of Grounded Theory, or simply Grounded Theory as it is more commonly known, is an approach developed by Glaser and Strauss (1967) and is solely a method for the analysis of qualitative data. Essentially it is one of

the few attempts to provide a means of formalising the operation of the principles of analytic induction first suggested by Znaniecki (1934) and later elaborated by others such as Robinson (1951) and Denzin (1970). The important features of the method are that it enables the researcher to 'discover' conceptual properties and categories which are embedded in the data and which the researcher causes to emerge from the data by following the procedures. This has to be seen as quite different to approaches of a more positivist nature which import concepts and hypotheses and are then led towards the attempted verification or testing of them.

It is not necessary here to describe in detail the steps used to carry out Grounded Theory analysis - there are a number of useful sources of guidance to the method, notably Turner (1983), Martin and Turner (1986), Strauss (1987), Charmaz (1983) and Strauss and Corbin (1990). These are discussed in some detail in section 3.1 and 5.3 The two critical stages of the Grounded Theory approach are those of constant comparative analysis, a procedure for the identification of conceptual categories and their properties which may be embedded in the data, and theoretical sampling, which is both an enrichment and a disconfirming procedure.

The problems with the use of Grounded Theory are essentially twofold. Firstly the approach is itself epistemologically homeless, and secondly, there seems to be little rigour demanded concerning the type of qualitative data suitable for analysis using the method, or about how such data should be generated or gathered. Whilst the method loosely owes much to an interactionist perspective, Glaser and Strauss show alarming lack of concern for the origins of data subjected to Grounded Theory analysis. Given the seriousness of their discussion about the relationship between theory and method (i.e. their method of data analysis and the theory it might produce) it is surprising that they give so little attention to other aspects of method, such as data generation. A Grounded Theory approach provides a means of data analysis and the mere fact of applying it to ontologically sound data makes it epistemologically secure.

Thus, taken together with an ethnomethodological perspective, the two approaches constitute a justifiable methodology.

One key reason for combining the two approaches is to provide reliable and rigorous data analysis, indeed Corbin and Strauss (1990) provide the necessary canons and evaluative criteria to 'prove' the rigour and reliability. However it may be argued that such criteria belong solely to the positivist tradition and that for the interpretivist researcher or analyst since what is being studied is always in flux then it makes no sense to 'worry about the accuracy' of the instruments (Marshall and Rossman (1989) quoted in Silverman (1993, p.146)). It is this latter argument that is the thrust for combining the two approaches into a methodology which it is proposed is largely interpretive in its nature.

In this section a methodology has been proposed which situates the requirements determination phase of information systems development in an organisational perspective. The basis for this is the use of Grounded Theory as a method of qualitative data analysis together with an ethnomethodological perspective as a paradigm of inquiry. The research will contribute significantly to the work in this area as outlined in section 1.4.1 and additionally it is proposed to provide a set of procedures to make the methodology useful for practising systems analysts.

1.5 Research questions

In this section the main research questions or research themes which the thesis seeks to explore are presented.

1. Is it possible that methods more commonly associated with social science research be used by a systems analyst to assist in the requirements determination process?

    1.1 In particular can the 'Discovery of Grounded Theory' method be used with an ethnomethodological perspective to provide a

useful methodology for practising systems analysts in requirements determination?

2. Can the scope of the rôle of systems analyst be defined in terms of an historical context and in terms of a future context?

   2.1 What is the rôle of information systems methodologies in defining the systems analyst's rôle?

   2.2 To what extent will the rôle of the systems analyst be defined by using methods from the social sciences?

3. Is action case, a research methodology based upon the tenets of action research, appropriate for theory testing in information research in general, and specifically is it appropriate for studying information systems methodologies?

4. How will the study help to define the boundaries and the unifying nature of information systems as a discipline?

It is expected that the questions, or themes, will be addressed both implicitly and explicitly as the thesis unfolds. In presenting these themes it is not the intention to judge the success of the thesis on the basis of the questions being answered, indeed the questions may change as the research progresses. The significance of the themes is to give a focus to the study and a position from which learning can begin. It should also be stressed that the themes whilst presented as separate numbered questions are integrated and interdependent. In section 8.3 the themes will be revisited so that the learning that has taken place both through the literature review and the empirical work can be evaluated and conclusions drawn.

1.6 Assumptions and Limitations

The study is limited to the requirements determination phase of information systems development. This is a conscious decision since this phase is

concerned more than others with the interaction of people in theorganisational domain and the methodology that is proposed is based on an explicit organisational perspective. The literature review may widen this focus in order to present a context for the empirical work but requirements determination remains the focus of the study. One important consequence of this focus is that the proposed methodology is not specifically concerned with design or implementation of information systems artefacts; it provides an organisational account which is the basis for information systems design.

One difficulty in presenting work in which the researcher is also the practitioner is that the two rôles may become confused. Throughout the thesis therefore care has been taken to distinguish the terms researcher when the rôle of the author is concerned with the learning processes and the research methodology and the term analyst when referring to the rôle of the author as the analyst performing the empirical work. Clearly the author himself is also a limiting factor in the research process. The author's stance is a view of information systems development which is socially constructed and whilst every effort is made to objectively view other perspectives the proposed methodology reflects this stance.

1.7 Organisation of the thesis

The remainder of the thesis will develop the argument which has been outlined in this introductory chapter. The thesis will take the basis of the argument and through the literature review and empirical work will elucidate and test the usefulness of the themes presented in the research questions.

Chapter two is a review of the literature in the information systems field which is pertinent to the argument. It is intended that the chapter will not only provide for the reader an academic context, but will also formulate a rationale for considering the sociology literature presented in chapter three.

Chapter three picks up the relevant sociology themes from chapter two such that together the two chapters provide the academic background for the consideration of social science methods in information systems practice.

Chapter four clarifies and justifies the research methodology and evaluates the selection of the chosen research method. Additionally this chapter considers the use of computers in qualitative data analysis.

Chapter five considers the detail of the methods associated with the proposed methodology. The selection of research methodology in chapter four and the explication of the methods in chapter five arises from and complements the literature presented earlier.

In chapters six and seven the two action cases are presented. These each follow the same format such that a brief history of the organisation is presented and then the account of organisational life which is produced using the methodology. This is followed by the practical recommendations made to the organisation and then from a research perspective the learning about the framework and the methodology is presented in the context of the research themes.

Chapter eight is the concluding chapter which summarises the work and formally evaluates the methodology using a methodology evaluation framework. The research questions are then revisited and reconsidered in the light of the literature review and the empirical work. This then leads to recommendations related both to practice and theory and concludes with an agenda for future research.

CHAPTER TWO

LITERATURE REVIEW - INFORMATION SYSTEMS

In this chapter the relevant literature in the field of information systems is reviewed. The selection of the literature is based on the research themes and the argument outlined in the introductory chapter. The purpose of the chapter is not only to present and critically evaluate the information systems literature but also to provide a link to the sociology research which follows in the next chapter. That is to say that for the thesis the link between information systems and the discipline of sociology is paramount if the adoption of sociological methods are to have a credible impact on information systems analysis. Therefore the review begins by focussing on this issue as it arises from the debate on IS as a discipline. The chapter continues by exploring the current debate involving information systems methodologies in general since the methodology in the study will add to this debate. A particular aspect of interest in this debate is the rôle of the information systems analyst in this field. The chapter then specifically is concerned with the domain of the methodology which is requirements determination and this is considered from both a formal engineering approach and a situational postmodern approach. It is this latter approach in which the proposed methodology lies. Thus by the end of the literature review in this chapter the reader will be in a position to understand the context and the discipline within which the proposed methodology is intended to have an impact.

2.1 Information systems as a discipline

It has been argued (Jayaratna, 1994) that the information systems field has emerged largely as a result of the inadequacies of the computer science discipline to address the organisational and business contexts in which computers, or indeed related technology, are used. This is related to the fact that the goal of the computer scientists was essentially technical and not managerial or social. Thus the field of information systems emerges from two

distinct and major disciplines - computer science and management science - which together address the technical, managerial and social aspects. There is in addition a host of supporting disciplines which vary in their impact and these include: sociology; psychology; mathematics; philosophy; economics. Indeed the measure of the impact of these major and supporting disciplines may be seen through the calls for multi-disciplinary and eclectic research in information systems (Nissen, Klein and Hirschheim, 1991). Adam and Fitzgerald (1996) note that

"....the IS field is not unique in having an eclectic and pluralistic foundation. It is quite natural in many emergent fields to borrow a foundation of usable knowledge and concepts from more mature disciplines" (Adam and Fitzgerald, p.18, 1996)

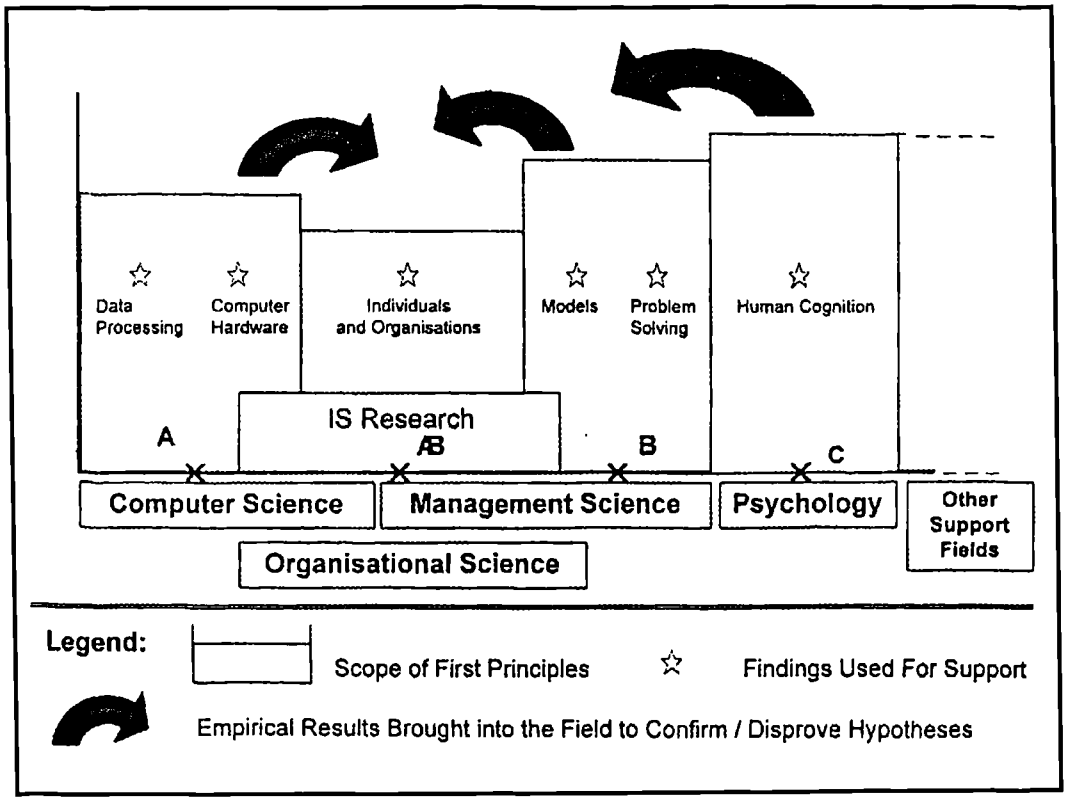


Figure 2.1 The Emergence of a Multi-Disciplinary Field (Adam and Fitzgerald, p.19, 1996)

They note particularly the emergence of psychology from psychophysical philosophy. They present diagrammatically the impact of the major and

supporting disciplines on information systems and this is given in full in figure 2.1.

If information systems can be considered as a distinctive discipline then the author would argue that it is because of its explicit treatment of human action and indeed the promotion of human action over technical expertise. Additionally then the technical expertise or 'hard' perspective may be considered as a special case of this human activity or 'soft' perspective (Checkland, 1981; Miles, 1989). Therefore a broad definition arrived at in this thesis in chapter one from Buckingham et al. (1987) quoted in Avison and Wood-Harper (1990) seems an appropriate starting point

"An information system is any system which assembles, stores, processes and delivers information relevant to an organisation (or society), in such a way that information is accessible and useful to those who wish to use it, including managers, staff, clients and citizens. An Information System is a human activity (social) system which may or may not involve the use of computer systems" (Buckingham et al. (1987) quoted in Avison and Wood-Harper, p.5, 1990)

Avison and Wood-Harper make the point that this is a very broad definition but that two critical points emerge. Firstly that an information system does not *necessarily* mean a computer information system and secondly that an information system is *always* a social system.

A further interesting point is that within the definition there is a lack of a paradigm which actually deals with the social sciences. This is most evident in the phrase 'assembles, stores, processes and delivers'. It is this view of information systems which, despite Avison and Wood-Harper's interpretation, has influenced all of systems development.

Jayaratna (1994) argues that this distinction between 'hard' and 'soft' is a philosophical difference between the ontological view of situations that is, the system as a given, and the epistemological view of system that is the

hermeneutic or interpretive view. Systems then are considered as conceptual devices for exploring situations.

The attempt to reconcile the difference at a philosophical level may be categorised by contingency approaches such as Multiview (Avison and Wood-Harper, 1990) in which technical or social approaches to information systems development are used for different stages of the systems development process contingent upon the problem to be solved. Further it is argued (Watson and Wood-Harper, 1995) that in practice information systems development methodologies are not in an objective sense literally read and hence slavishly followed but instead are metaphorical in terms of both the practitioner's experience and the properties of the methodology. Then this contingency approach, or more correctly methodological pluralism, has a basis in practical systems development and an absolute position of 'hard' or 'soft' is a distortion of what happens in practice. Thus Watson and Wood-Harper would maintain that the 'hard' 'soft' debate recedes. The contingency position is questioned by Jackson (1992) who whilst an advocate for methodological pluralism is concerned with the true complementarism of contingency approaches, such as Multiview, at the level of theory. One positive aspect of moving the debate from 'hard' 'soft' is that it is less likely to exacerbate the bi-polar drift and more likely to consolidate theory in this area.

A further contribution to reconciling 'hard' and 'soft' is presented amongst others by Vidgen (1993) and Walsham (1993b) who maintain that an understanding of information systems and information systems development may be sought from Giddens' (1984) structuration theory. Briefly structuration theory is concerned with conflating the two absolute positions in sociology between agency and structure. There is a resonance for this in the information systems debate and this is discussed in greater detail in a review of the sociology literature in section 3.3.

In this study the development and evaluation of a methodology in action which borrows from the social sciences should help to define the boundaries of the

information systems discipline by using sociological theory such as Giddens' (1984) structuration theory. It should also avoid the trap of adding to the convergence of the discipline and help to counter claims of 'carefree borrowing' from, or 'trivialising' of, the reference discipline. To aid readability these links are followed through in chapter three.

A major area of study in which the information systems discipline and the reference discipline problem receives most attention is that of information systems methodologies and the frameworks for categorising methodologies. This has been touched upon in this section but is covered in detail in the next.

2.2 Information systems methodologies

The word 'methodology' has an ambiguous meaning in the information systems domain. The word is derived from the Greek meaning 'the study of methods' and in a scientific research sense it retains that meaning. In information systems the term 'methodology' is synonymous with 'method'. Wynekoop and Russo (1995) note that the diversity of opinion within the field of information systems as to a consistent definition of methodology leads to difficulties when applying or discussing research. This clearly is the case when a researcher seeks to establish whether methodologies are used in practice since the practitioner definition may be inconsistent with the researcher definition and hence may invalidate the research. Evidence of this can be found in Russo et al. (1996) which uses quantitative measures to establish the degree to which organisations use methodologies in whole or in part. The authors explicitly define what a methodology consists of as

"a set of guidelines, activities, techniques and tools, based on a particular philosophy of system development and understanding of the target system"
(Russo, Hightower and Pearson, p.387, 1996)

although the questionnaire made no attempt to confirm that the respondents shared the meaning of methodology. This may not be so critical since much of

the debate concerning definition rests with the academic community and as Jayaratna (1994) notes

"the term 'methodology' is pragmatically well established within the field of information systems to mean the same as 'method'" (Jayaratna, p.35,1996)

That is to say in practice 'methodology' is taken generally to mean published and named sets of procedures for dealing with some or all aspects of information systems development. It would also include variants of named approaches that have been adapted either by individual systems developers or in-house by management agreement.

Unfortunately this rather all encompassing view is not particularly helpful to the research community in trying to establish what happens in practice and whether practice can be improved. The author's own work in this field (Hughes and Reviron, 1996) used a Grounded Theory analysis of transcripts from semi-structured interviews to determine the ways that systems developers use the term 'methodology' in practice. The result of the analysis is expressed diagrammatically in figure 2.2

Although the number of interviewees was small (7 systems developers) the research shows that a systems developer uses skills, experience and education in order to interpret and evaluate stimuli from three major external sources: experience of others; domain and constraints of the organisation and problem domain; the theory of IS methodology. The evaluation from the internal and external sources is intuitive rather than structured or formal. The reasons for the decision to proceed towards a way of working are not documented. The result is a 'way of working' or a loose methodology in practice from which the analyst learns. The learning is then internalised in terms of augmentation of skills and experience.

In terms of a definition of methodology from this, the research indicates that practitioners view the published or named methodologies as being 'theoretical' or 'static'. They prefer to think about their own dynamic way of working as

being the methodology in practice which is an adaptation of, or a considered selection from, the theoretical named methodology.

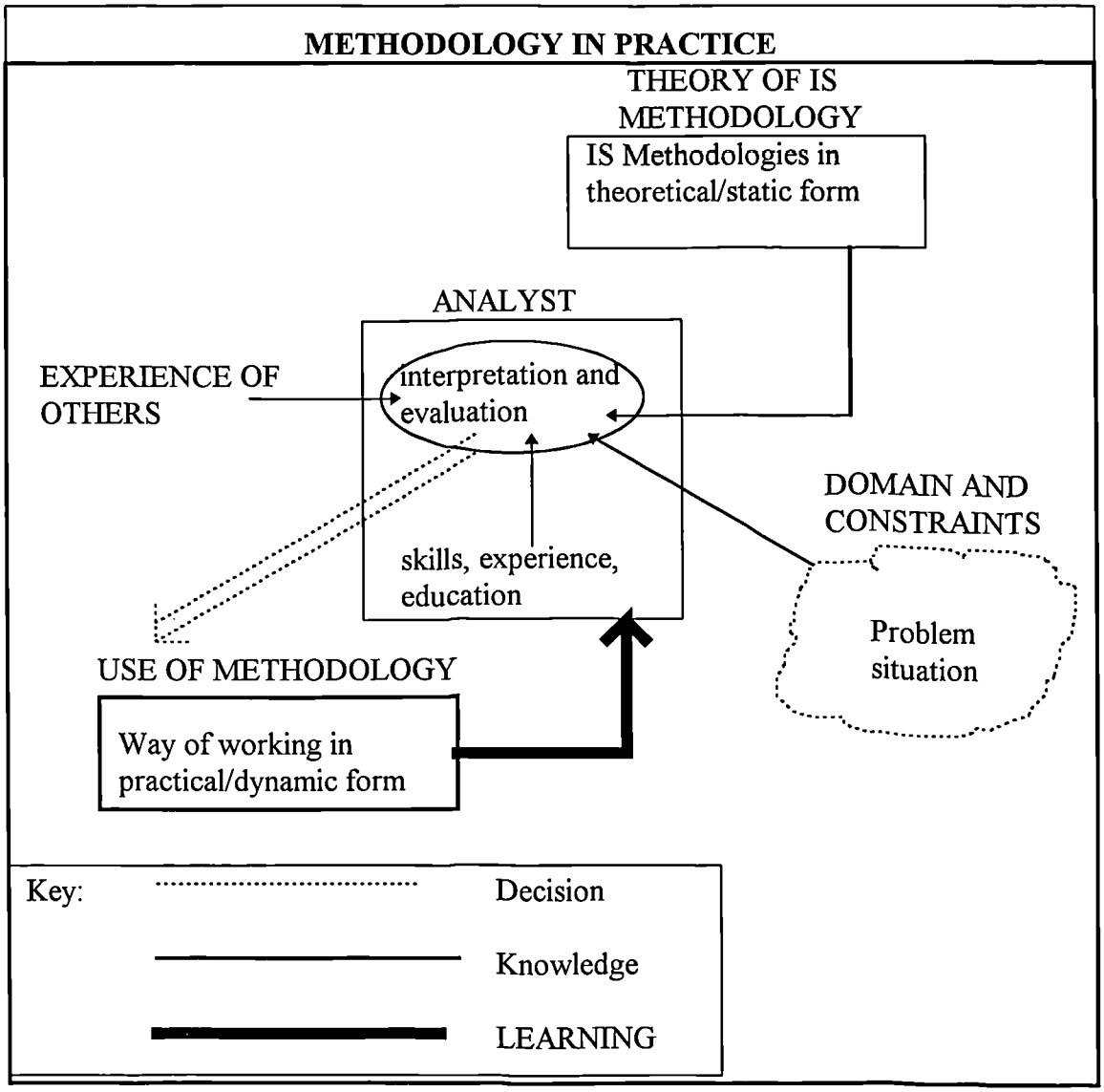


Figure 2.2 Diagrammatic representation of a systems analyst's learning framework (Hughes and Reviron, p.317, 1996)

This is consistent with the view held by West Churchman in his excellent and seminal discourse on the design of inquiring systems in which he explores the nature of design and methodology (Churchman, 1971). His essential premise was that design moves from the specific to the general, and having achieved generality may then be adopted as a methodology for a class of problems. He maintained that the general methodology has its status because of its success in

use but that every future use of the methodology would adapt, test and evaluate with a view to improvement. Only in the case of tightly defined or enclosed systems can a methodology be presumed to be appropriate every time. This perspective forms much of the basis for the research which led to the development of the NIMSAD framework for understanding and evaluating methodologies (Jayaratna, 1994) and in particular he notion of 'methodology-in action'. Jayaratna notes that

"The structure, steps, models, values and philosophy of the methodology-in-action may very well be different from either those explicitly outlined in the methodology (creators' rationale) or those that were interpreted and changed by the methodology users in the context of their own 'mental constructs' (methodology users' rationale) before intervention.....Our interest of course is to engage in reflection-in-action (Schon, 1983) as a way of learning about these interventions" (Jayaratna, p.229, 1994)

Wastell (1996) notes that if methodologies are applied in a rigid and mechanical way then this jeopardises the learning process for the systems developer. With respect to the use of methodologies in practice he states that

"methods can be successfully assimilated and used by practitioners in a critical and flexible way; evidence suggests that this adaptive reaction is common especially in experienced designers.....developers characteristically redefine and adapt them in terms of their preconceptions and local exigencies" (Wastell, p.37, 1996)

Wastell (1996) also notes that commentators who, wrongly, may be considered advocates of rigorous application of the steps of methodology (DeMarco and Lister, 1987) have themselves pointed out that

"methodology is less important than the abilities, inventiveness and determination of developers.....detailed methodologies stifle creativity and reduce, rather than increase, productivity" (Wastell, p.30, 1996)

Fitzgerald (1996) draws attention to the concept of 'goal displacement' when considering the rôle of methodology in a systems development environment.

Goal displacement in this context means expending excess attention on ensuring that the steps of the methodology are being rigorously applied to the detriment of the true goal which is the development of the system. Here as with Wastell there is the danger that learning is inhibited and that 'methodology-in-action' is never achieved. More precisely put - learning may be achieved but no lessons derived from it.

It seems clear therefore from this discussion that it is not so much the definition of methodology which needs to be consistent but of greater concern is the use of methodology without understanding the context which may jeopardise learning. That is to say the concern that must be paramount for the systems developer is to be able to give the reasons *why* they are following suggested steps in a suggested order and if there is an adaptation of the methodology as a result then this must be explicit and shared.

Arriving at a pragmatic definition of methodology in action does not assist in the selection of a particular methodology for some part or all of the systems development process. Wynekoop and Russo (1995) report that in a survey on the SSADM methodology in the United Kingdom (Edwards et al. 1989) most of the organisations had adopted it because it was the official methodology for government agencies. They also report on a further survey of over 100 companies in which 65% of the companies claim to have developed their own in-house methodology for systems development (Russo and Klomparens, 1993). But little is known about the in-house methodologies and if they have been developed from scratch or whether they are adaptations of commercial published methodologies. Whilst there is a paucity in the literature to inform on the selection of methodology there do exist, at least among the academic community, frameworks to assist in the selection of appropriate methodologies. Olle at al. (1982, 1983) have organised conferences at which different methodologies have been discussed in terms of the merits and demerits but many of the methodologies targeted were based on data modelling, thus not providing a coverage which could be of wider use. Others have provided criteria for comparison of methodologies, Chapin (1981), Martin and McClure

(1988), Karam and Casselman (1993), Olle et al (1991) which largely concentrate on the technical features rather than conceptual aspects. Jayaratna has been a leading proposer of a framework which incorporates a conceptual and systemic approach to methodology evaluation. The rationale behind NIMSAD (Normative Information Model-based Systems Analysis and Design, Jayaratna, 1994) is to provide a generalised framework for understanding and evaluating any methodology. The important feature is that the framework is not intended to replace the user's thinking processes but rather to 'sharpen' these processes.

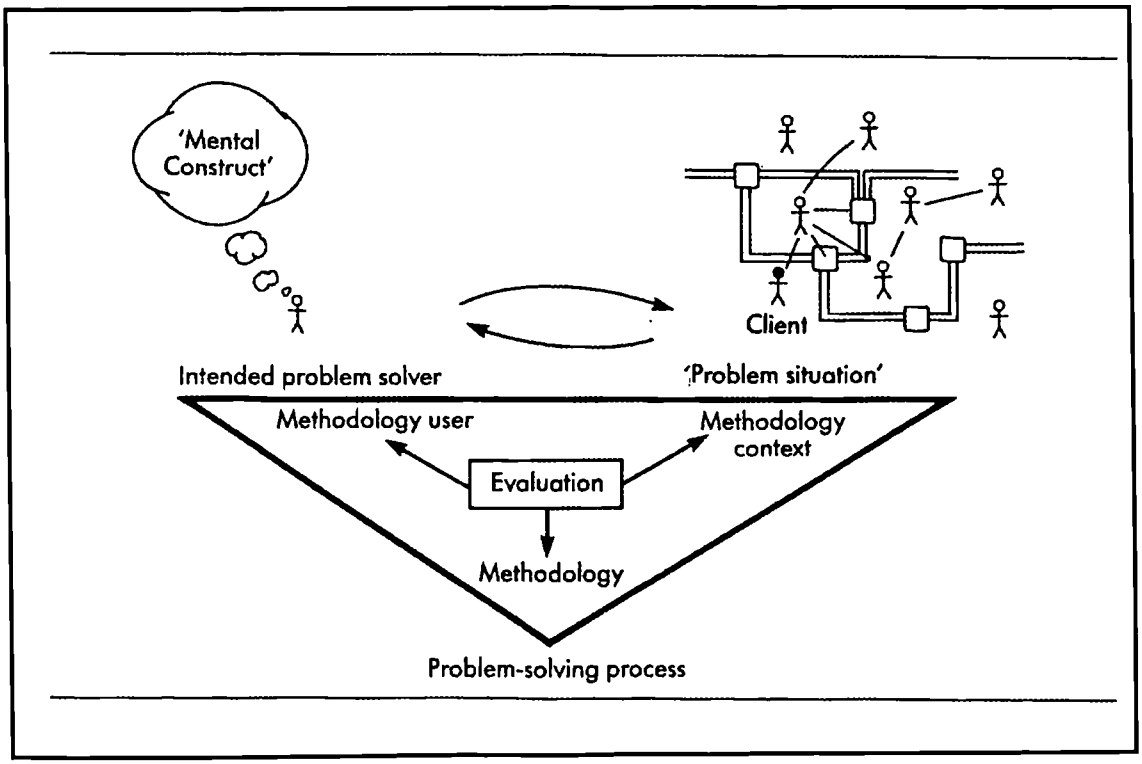


Figure 2.3 The NIMSAD framework (Jayaratna p53, 1994)

Jayaratna (1994) stresses this sharpening:-

"The use of the framework as an instrument of learning also helps to consider the implications of ignoring the role of critical self-reflection. It is only by considering the framework as an instrument for creating discussions and subjecting methodologies for critical examination that it could help in generating critical self reflection.....the success of the NIMSAD framework depends on the nature of the questions it raises for methodologies and their use in practice for bringing about transformations. Achievements in practice

depend very much on the skills and abilities of the methodology user, and not on any framework" (Jayaratna, p.235, 1994)

NIMSAD has four essential elements: the problem situation (the methodology context); the intended problem solver (the methodology user); the problem solving process (the methodology); the evaluation of the first three elements before, during and after the use of a methodology in a problem situation. The framework is best expressed in diagram 2.3.

Jayaratna targets the NIMSAD framework at practitioners and those in universities who aim to become practitioners and yet some of the discussion is highly conceptual and beyond a common understanding. In particular the framework requires a detailed understanding of organisation and organisational issues. Furthermore as noted by Oates (1995)

"only the process of problem-solving is considered. However a methodology can also deal with, and produce, data which can be thought of as the products of a methodology (both intermediate and final) ....users may need to complement the NIMSAD framework with, for example, the component analysis of Olle et al. (1991)" (Oates, p.127, 1995)

However as a framework for use in the education of practitioners NIMSAD may prove a very useful framework since in the spirit of Schon (1983) it encourages critical self reflection and learning.

In this study information systems methodology is very much at the fore. What is important from the literature is that when the methodology is used in action (practice) then it should be possible to adapt the methodology and to learn from the experience. Furthermore it should be possible to use one of the frameworks for methodology evaluation to critically evaluate the methodology in the study. An important aspect of methodology use is the rôle of the systems analyst and not least in this study because the methods are those of the social sciences. In the next section the changing rôle or more precisely the new rôle of the systems analyst/developer is discussed.

2.3 The rôle of the systems analyst/systems developer

In this section consideration will be given to a historical perspective of the rôle of the systems analyst and consider both why and how the rôle is changing. Attention will also be given to the future rôle in new organisational forms and new ways of working.

The term 'systems analysis' has been attributed to the RAND Corporation and developed by other groups (Smith, 1966; Optner, 1965; Quade 1975; Miser and Quade, 1985,1988) and it brings together ideas and techniques from engineering and economics to provide practical guidance to those involved in the development of projects which usually involve the intervention, at some stage, of technology. Graf and Misic (1994) provide the following definition of the traditional rôle

"A systems analyst is a problem solving specialist who works with users and management to gather and analyse information on current or future computer based systems. With this information, the systems analyst, working with users and other MIS personnel, defines the requirements which are used to modify an existing system, or develop a new system. The systems analyst identifies and evaluates alternative solutions, makes formal presentations, and assists in directing the coding, testing, training, conversion, and maintenance of the proposed system." (Graf and Misic, 1994)

and Vitalari and Dickson (1983) refer to the systems analyst as

"an individual who analyses organisational requirements for information and designs a computer-based information system to collect, store, and disseminate data in support of organisational goals" (Vitalari and Dickson, p.948, 1983)

Another forbear of the current systems analyst is the Operational Research (OR) field.

"Operational researchers went on to work out the applied mathematics of the logic of some common situations which recur such as managing queues,

locating depots, deciding when to replace capital equipment or assembling an investment portfolio" (Checkland, p.74, 1989).

The underlying thinking behind both OR and systems analysis can be considered to represent an approach to problem solving which is a rational means of achieving objectives considered to be desirable. As discussed earlier in section 2.1 this is considered to be 'hard' systems thinking. The rôle of the systems analyst is cast as 'system expert' and as Hughes and Burgess (1995) note

"little attention is paid in the definition to how the analyst 'works with users and management'. The emphasis is on the analyst's approach as the technological problem solver" (Hughes and Burgess, p.132, 1995)

This traditional view is reinforced by Feeney and Sladek (1977). In their research which appears deceptively promising they recognise that the success of a systems analyst

"depends upon his [sic] ability to play the right rôle with the right people at the right time" (Feeney and Sladek, p.85, 1977)

and as a result they identify the characteristics which an analyst would need to be an effective change agent. It is deceptive since the perspective of the authors about the systems analyst is that

"His [sic] task is to plan and gain acceptance for organisational change" (Feeney and Sladek, p.85, 1977)

Hence the authors view the problems facing the analyst, outside of the technical analytic skills, as being those associated with driving through change or winning support for change which is given as desirable. The four primary rôles that they suggest are: persuader; catalyst; confronter; imposer. In determining which rôle is appropriate in which situation they suggest that the rôles vary from mild to severe interventions. Thus, they suggest that when organisational conditions are such that people have some tolerance of change then the analyst adopts the rôle of persuader and catalyst. The other rôles are more appropriate

when resistance to change is great, and that over the life time of a project the analyst may switch rôles according to the prevailing mood of those with whom he or she is dealing.

The conclusion they draw is driven by their original 'hard' systems thinking.

Interestingly more recent work by Fougere (1991) draws not dissimilar conclusions to those reached by Feeney and Sladek. Fougere (1991) considers the future rôle of the systems analyst as change agent in order to build successful information systems. He places a greater emphasis on the users of the system but only in order to define the rôle of the analyst as someone who must motivate the users to make decisions and to be interested. Above all he points out the importance of

"convincing them [the users] that they [the analysts] are capable of solving their problems" (Fougere, p.9, 1991)

Again the perspective is one of analyst as system expert and the user as some benign object to be persuaded to help meet system objectives. Interestingly the rôle of salesperson that he describes suggests that the analyst can 'sell' anything provided he or she has the motivation or belief. This rôle rejects the idea of engagement with users to understand meaning as expressed in this thesis and embraces rather the idea of engagement to convince users of some pre-determined position.

One interesting approach to forecasting the future rôles of the systems analyst was that adopted by Kendall et al. (1992) who used a method called SEER (Scenario, Exploration, Elaboration and Review) in which each of the four authors (self appointed IS experts) independently considered the rôle of the analyst in the 21st century and then generated the problems they would foresee. This is followed by a review of the four pieces of elaboration to identify common themes and also conflicting ideas. The resultant common themes were firstly the dangers of excess when overburdening the analyst with likely rôles. This could lead to rôle conflict as identified elsewhere (Hughes and Burgess, 1995). The second theme is to strike the balance between

specialisation and generalisation which they concede may largely be contingent upon organisational demands and domains. The third theme is to strike the balance between training and experience, and whilst they recognise the importance of education they do not explicitly distinguish between training and education. The fourth and final theme, and one which they maintain encapsulates the others is flexibility in the face of uncertain futures. They conclude by noting that

"...as the IS function becomes more deeply rooted in the mainstream of organisations, both in terms of structural links and collaborative activities, there may be less room for manoeuvre and change.....These may prove to be the biggest obstacles to a successful rôle for the systems analyst in the twenty first century" (Kendall et al., p.134, 1992)

Unfortunately, following a somewhat innovative approach to the research method this conclusion presents a rather pessimistic view of the future rôle and provides no strategy by which the pessimistic view may be turned round.

Research such as the above and others that deal with skills of the analyst (Vitalari and Dickson, 1985; Graf and Misic, 1994; Hunter, 1993; Brooke, 1995) fail to provide a critical view of the analyst's rôle and singularly fail to provide a perspective of the analyst's rôle that is something other than functionalist. Research which does take an eclectic and critical view is that by Hirschheim and Klein (1989).

Hirschheim and Klein (1989) present four paradigms for information systems development based on a sociological framework proposed by Burrell and Morgan (1979). The framework is presented in figure 2.4. They propose that systems analysts make implicit assumptions about the systems development process and that this influences the choice of methodology which they use which can inhibit creative solutions to organisational problems involving technology. They present four rôles for the systems analyst, one from each of the four paradigms.

The first rôle is the traditional rôle of system expert in a functionalist paradigm. The analyst is technical expert in terms of the use of tools and techniques to perform the analysis. Hirshheim and Klein (1989) note that in this rôle the analyst assumes a single view of reality and accepts without question that the organisational objectives are understood, agreed and unambiguous. They note that in practice this is rarely the case.

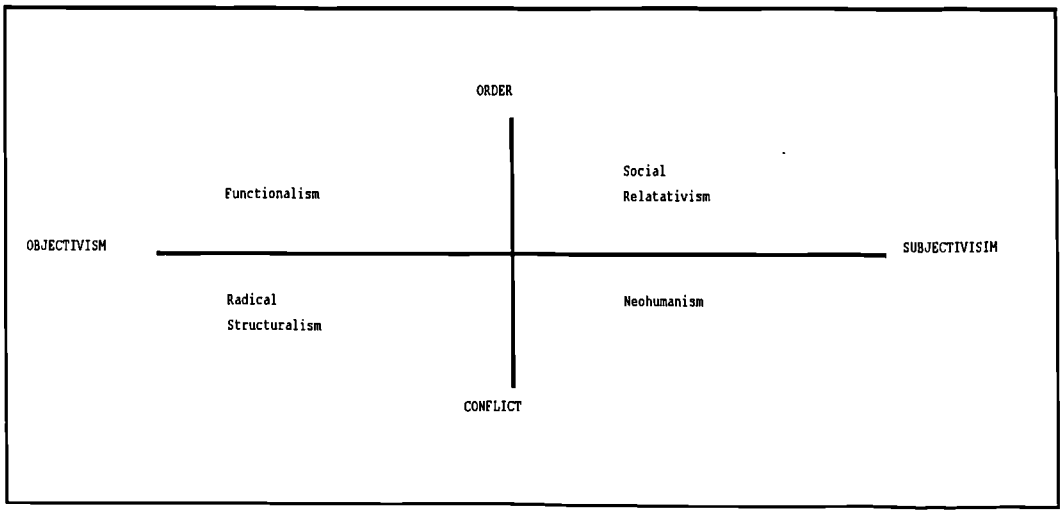


Figure 2.4 Information Systems Development Paradigms adapted from Burrell and Morgan (1979) (Hirschheim and Klein, p.1202,1989)

The second rôle is that of facilitator in a paradigm of social relativism. In this rôle the analyst recognises that multiple views exist and that it is the analyst's rôle to encourage and manage debate about the views of system in order to achieve consensus through participation. However because of its relativist position they argue that in this rôle the analyst remains largely uncritical with respect to power relations and manipulated consensus. The third rôle is the analyst as labour partisan or emancipator in the radical structuralist paradigm. In this rôle the analyst takes an explicit political or ethical position on behalf of the workforce to redress the power relations between managers and the workforce. This rôle can be seen, in counterpoint to the rôle of facilitator which is largely a benign rôle, as an active rôle where the analyst explicitly expresses his or her labour partisan view and acts to achieve this. The fourth

rôle is that of social therapist in the paradigm of neohumanism. In this rôle the analyst acts as an emancipator or 'social therapist' sometimes called 'warrior' (Avison and Wood-Harper, 1990). The aim for the analyst is to try and create the conditions for open and free discussion by critically examining the power relations that exist and in particular identifying the barriers to free expression in the existing structures and language use. This final rôle is developed from critical theory and the work of Habermas (Habermas, 1972). Hirschheim and Klein concede that this final rôle is difficult to achieve in practice and is largely hypothetical. However they stress the importance of the rôle in providing a critical view of the systems development process.

The strength of these four rôles is that although seemingly theoretically constructed they provide a classification of rôle that is conceptual rather than skills based and as such enables a deeper and philosophical insight into the analyst's rôle. As Walsham (1993a) points out

"The roles can be seen as stories, following Hirschheim and Klein's lead or perhaps as metaphors for analyst action in the IS domain. Their value is as ideal types for discussion and comparison with empirical evidence, rather than as pigeon holes for classifying human actions." (Walsham, p.284, 1993a)

Walsham (1993a) extends the neohumanist emancipator rôle to retain the concept of critical analysis but uses the term 'moral agent' instead. He sees this rôle as analysts asking questions of themselves about the motivation for the work they are doing and the ways in which their work affects others.

"The goal of such questioning is greater self-understanding, both in terms of the analyst's own motives and the place of the analyst in the broader social and organisational context' (Walsham, p.283, 1993a)

He recognises that this may be somewhat self-centred and certainly limited in achieving emancipatory objectives but points out that changes by the analyst, albeit small, are achievable. He concludes by noting that if analysts were to be critical and self-reflective in enough numbers then as a cumulative effect it could lead to 'positive and significant societal change'. This contribution is

certainly valid particularly in that it complements the work on methodologies and the contribution to learning from methodologies in action (Jayaratna, 1994). A criticism of the paper is the grandiose suggestion that positive and significant societal change could result. It may be more realistic to consider that reflecting on ethical in addition to human and organisational issues adds to the analyst's self reflecting skills and that the significance of the change is likely not to extend beyond the analyst's own domain.

Wood-Harper et al. (1996) examine in some detail the ethical rôle of the systems analyst. Rather than a consideration of the moral and critical questioning as advocated by Walsham (1993) they

"advocate the explicit analysis of the implications of design decisions using a basic understanding of ethical theory" (Wood-Harper et al., p.70, 1996)

They rightly point to the lack of treatment of conflicts from any ethical perspective in the traditional information systems methodologies, and note the benign acceptance by systems analysts of the ethic embedded in the methodology which is usually associated with meeting given efficiency and effectiveness measures. They note that

"a system which is 'good' by these standards may result in loss of access to data or in a form of electronic monitoring that may be unethical from the perspective of the employee" (Wood-Harper et al., p.70, 1996)

They present a review of normative ethics theory and discuss the steps for an ethical analysis and the relationship with Soft Systems Methodology (SSM) based on a case study of a community health system. They conclude that ethical analysis is more definitive than other human centred approaches to analysis such as SSM (Checkland, 1981, Checkland and Scholes, 1990), Mutiview (Avison and Wood-Harper, 1990) or ETHICS (Mumford, 1994) since from ethical analysis it is possible

"to gain more of an understanding of why the issues or concerns exist and to a limited extent, how these ethical perspectives might affect the implementation of the information system" (Wood-Harper et al., p.76, 1996)

However whilst the research is convincing in terms of the value of the rôle of an explicit ethical analysis it is less convincing in presenting a new rôle for the systems analyst. The work largely concludes on the analyst's rôle issue by agreeing with Walsham (1993a) about self-reflection in practice and yet in its introduction it promised more than this. If it adds anything to Walsham's view of the moral agent then it adds a method to force self-reflection and to make ethics an explicit issue for information systems project managers.

A further dimension to the rôle of analyst is offered by Stowell (1990) who presents the case for suggesting that the systems analyst is no longer expected solely to be a technical expert but to have a wider brief as consultant on the problem situation. In particular he notes that

"An analyst needs to attempt to recognise the interpretations that individuals make of their social surroundings, and to note such identification and the context in which the technology is to operate" (Stowell, p.21, 1990)

He recognises that the implications of the statement implies much more than telling analysts to change their rôle and he makes specific suggestions with respect to training and education programmes in order to address this new skill set of the 'system consultant'. In particular he suggests that IT Postgraduate Conversion courses may be a way of coping with the new requirements.

Unfortunately Stowell does not go the extra step of suggesting the rationale for any such curriculum which could neatly be borrowed from Walsham (1993b) to be based upon critical self-reflection. However more recently Mathiassen et al. (1997) provide an interesting training program for developing managerial skills in IT organisations which supports critical reflection and organisational learning which could be the basis of such a curriculum.

Nicholson and Hughes (1996) consider the changing organisation structures and work patterns of the future since this is very likely to affect the development of information systems and hence the rôle of the systems analyst. They note that from an organisational perspective, there is intense interest in autonomous self managed work groups; electronic communities enabled by telecommuting schemes, "hot desking", hotelling and groupware. When coupled with outsourced functions, these new working methods produce the "virtual" corporation. The implications for information systems methodologies is that there is a threat of a reversion to the positivist approaches since the human centred approaches lay tremendous store by face-to-face contact and 'real' rather than virtual meetings for debate. For the systems analyst this may pose particular problems since many of the techniques and methods espoused by methodologies such as ETHICS or SSM may prove to be unusable, and those espoused by the 'hard' methodologies such as SSADM may be the only methods which remain to be of practical use. This has a particular resonance when viewed alongside the future of Scandinavian research in information systems (Bjerknes and Bratteteig, 1995) where the older concept of the use of computers to exert power and control over workers by employers and hence inhibit workplace democracy, is replaced in the future by information systems being used as the technology which connects teleworkers to organisational centres and the rôle of the analyst is to exploit the technology to enable employers to exert power over the telework employees. A less Orwellian future is that proposed by Walsham (1995) whereby analysts evaluate their ethical and moral position with respect to this technocratic scenario to establish a human-centred approach to the development of the information systems. That is to say to explicitly develop information systems which support teleworkers and promote well-being rather than tacitly approve the extremes of management and control.

This section has considered a changing rôle for the information systems analyst. It has traced the historical roots of systems analysis from the second world war and considered new rôles for the analyst today as consultant, reflective practitioner, and moral agent. In addition it has considered the impact of the

rôle in the light of new forms of organisation and new ways of working. What remains interesting from this study is the extent that the explicit use of social science methods has on the analyst's rôle and if so whether this insight can meaningfully add to the preceding discussion.

In the next section consideration is given to the phase of systems development which is the most organisationally dependant, that is requirements determination (elicitation) since it is in this phase of development that the rôle of the analyst is the most critically under scrutiny.

2.4 Requirements determination

This section will consider arguably the most complex aspect of systems development, the determination or elicitation of user requirements. The complexity arises not in a technical sense but rather from a social sense since requirements are grounded in organisational structure and individuals' behaviour (Flynn and Warhurst, 1994). Indeed much attention is given to the determination of requirements since reportedly poorly understood requirements lead to poor quality systems (Luff et al., 1994). Ths section will discuss the nature and meaning of requirements and present both the classical approaches and the emergent or postmodern approaches to requirements elicitation. Stress will be placed on those approaches which attempt to reconcile the technical and social issues and a case will be presented for the treatment of the elicitation process as being similar to that of sociological research.

2.4.1 The classical approach

The classical approach to requirements elicitation revolves around the rôle of the requirements engineer and in using a term such as engineering it therefore constrains the process to be largely technical. Indeed the main rôle of the requirements engineer is said to be to 'capture' requirements. The suggestion being that requirements may be difficult to find but they exist in a deterministically fixed form and indeed the implication is that there is a finite

number of them to be found. The classical methods are restricted to questionnaire and interview but as Jirotka and Goguen, (1994) note

"the analysis of the materials gathered is largely left to intuition" (Jirotka and Goguen, p.4, 1994)

In practice most requirements specifications, which are considered to be the product of a requirements elicitation exercise, are written in natural language supported by diagrams which conform to some predetermined standard. Examples of standards of this type are the STARTS Handbook (NCC, 1989). McDermid (1994) identifies the structure of typical orthodox requirements specifications and these are shown in figure 2.5.

McDermid notes that global considerations of requirements may also be included but these tend to more problematic since they deal with properties that may be considered to be emergent rather than decomposable. Typically then if the functionality and other non-functional properties can be decomposed into modules then these may be allocated to software engineers to implement.

- the core of the specification is a set of function definitions, setting out the functions to be performed by the system, and supported by a description of the structure of the data to be processed.
- Typical functional specifications cover, at least
  - normal functioning, including inputs, outputs, operation, and control
  - abnormal functioning, exceptions etc.
  - dependability properties eg safety and security
  - performance eg throughput
  - quality eg maintainability or modifiability
  - expected changes
- data specifications:
  - definition of data structure
  - volumetrics, eg data flow rate
  - sources and sinks of data

Figure 2.5 Structure of typical orthodox requirements specification (adapted from McDermid, p.24, 1994)

The problem with this approach to requirements elicitation is that although the specification may be considered to be good it may not be appropriate. As

Valusek and Fryback (1985) explain the process of information requirements determination is a process which incorporates obstacles *within* individual users, *among* users and *between* users and systems developers. In the case of obstacles among users they maintain that users' descriptions or definitions of similar functions or requirements may be quite different, and then that the meaning that systems analysts attribute to the responses in interviews or questionnaires, that is their interpretation, may be different from the meaning held by the users. It is the obstacles within individual users that Valusek and Fryback claim has received little attention, that is the problems associated with the understanding of the user due to cognitive limitations on memory, recall and judgement - what Davis (1982) calls the constraints on humans as information processors and problem solvers. In the case where the specification is to have a level of detail to enable software engineers to code then these human centred problems are exacerbated rather than mitigated.

There is also the problem in validating requirements, a problem linked to the above, because of the semantics of natural language (Auramaki et al., 1988) and as McDermid (1994) notes somewhat cynically the validation process for such specifications merely documents

"what it is that the analyst thought it was the problem owner said he thought he might want, not what he'll get!" (McDermid, p.25, 1994)

For the sake of simplicity one may consider that resolution of the requirements problem largely falls into two broad approaches. The first may be considered to stay true to the formalisation of requirements and the object paradigm and yet recognises the evolutionary and conflicting nature of the requirements in methods such as ViewPoints (Easterbrook and Nuseibeh, 1995) or to deal with the complexity of requirements and the need to verify them such as the Use Case approach (Regnell et al., 1993; Jacobson, 1992). The second broad approach may be considered to be the explicit recognition of the social dimension of requirements (Hughes et al., 1995; Goguen, 1993). Each of these broad approaches is taken in turn below.

Easterbrook and Nuseibeh (1993) provide a framework for requirements specification which can not only detect and resolve inconsistencies in the specification but can tolerate inconsistencies by recording relationships between resolved and unresolved inconsistencies. The partial specifications are known as ViewPoints. They claim that the framework differs from earlier attempts to use ViewPoints to validate requirements (Leite and Freeman, 1991) and preparing service-oriented specifications (Kotonya and Sommerville, 1992) because they explicitly use ViewPoints to

"organise multi-perspective software development in general, and to manage inconsistency" (Easterbrook and Nuseibeh, p49, 1995)

They consider the ViewPoint to be an 'actor', 'rôle', or 'knowledge source' in the development process combined with a 'view' or 'perspective' which an actor maintains.

Within this framework the perspective of the developer remains that formal specifications need to be derived. What sets this approach apart from the more conventional formal specification is that a number of formal specifications may co-exist and be inconsistent. The thrust behind the framework is the management of the inconsistencies over time through re-negotiation of the specification. The implication remains that in the end inconsistency can be resolved and requirements truly captured.

In similar vein Renell et al. (1995) propose a Use Case driven approach to the requirements determination process which is a process which captures both functional requirements and system usage aspects. The concept of Usage Oriented Requirements Engineering (UORE) which they propound originates from Jacobson's (1992) Use-Case Driven Analysis (UCDA) and the Objectory method. The approach recognises two main problems with the elicitation of requirements as discussed earlier - the semantic gap between requirements description and requirements specification and the difficulty of producing a formal specification without a deep understanding of what customers and end-users expect. In Jacobson's original UCDA and in the revised UORE the

actor is a specific rôle played by a user (representing a category of system user) and the 'use case' is systems usage scenario characteristic of a specific actor. The use case is expressed in natural language. The UORE extends the UCDA by introducing a synthesis phase where separate use case scenarios are integrated into a Synthesised Usage Model (SUM). The approach uses formal graphical representation and abstraction mechanisms for representing both use and system actions. The authors propose that the strengths of the approach include the possibility for tool supported verification of the models.

As with Easterbrook and Nuseibeh above the approach largely depends upon the systems designer as expert requirements capturer and whilst acknowledging the problems of the formal specification seeks to overcome the problems by more rigorous formality. As shall be seen below these 'formal' requirements approaches may require a paradigm shift in the thinking of designers rather than more rigorous tools.

2.4.2 The postmodern approaches

An alternative view of the requirements process is that proposed by Goguen (1992) in which he discusses the relationship between formal, context insensitive information (the dry) and informal, situated information (the wet). Although not mentioned by Goguen there is some resonance in the work of the structural anthropologist and postmodernist Lévi-Strauss (1977,1978) and the 'raw' - 'cooked' dichotomy. Lévi-Strauss uses a culinary metaphor to represent structure as the intersection of two sets of binary opposition to produce a triangular system of possibilities. In the metaphor he classifies the possible states in which food may be found. He states that normal untransformed food is 'raw' and may be considered the apex of a triangle. It is transformed culturally into 'cooked' or naturally into 'rotten' and these form the base points of a triangle. The three points exhaustively cover all possible states. The problem for Goguen in presenting 'dry' - 'wet' is the possible reconciliation between seemingly mutually exclusive states and he maintains that

"Formal information occurs in the syntactic representations used in computer-based systems. Informal situated information arises in social interaction, for example, between users and managers, as well as their interactions with systems analysts. Thus requirements engineering has a strong practical need to reconcile the dry and the wet" (Goguen, p.1, 1992)

Goguen's perspective is interesting since in addition to applying techniques from the social sciences to requirements elicitation, notably ethnomethodology and conversational analysis, he also demonstrates that 'dry' abstract data types occur in ordinary discourse in everyday life.

Goguen identifies four cultures in the computing discipline that he maintains are useful when considering requirements. The 'hacker' culture which although undisciplined leads to some creative and often effective systems. The 'dry' culture which takes the precision of formal mathematical logic as their base. This culture maintains that requirements can be expressed by some precise language and that the logic can reduce or eliminate ambiguity. The 'wet' culture which maintains that factors from the social world lie at the root of requirements and hence calls for methods from the social sciences to elicit requirements. Finally the 'theory' culture which has close links with the dry culture but differs in that the theoreticians like to produce theorems about some area of Computer Science and are related to practice only in that they provide explanations.

Goguen works on the theory that every requirements method has its own, often unarticulated, theory of organisations which is an implicit social theory. He therefore considers the work of Lyotard (1984) in classifying sociological theories in order that the classification of requirements methods be better understood. Lyotard distinguishes between modern and postmodern theories and in modern theories he further distinguishes unitary and dual approaches. Where unitary approaches assume some unique 'real system' to be 'captured' the dual approaches assume that the most important feature of an organisation is the split between workers and managers (also called critical or neo-Marxist approaches). The postmodern theories assert that organisations are composed

of many "local language games" that cannot necessarily be easily unified or reduced into parts. Goguen purports that using a modified taxonomy (Figure 2.6) it is possible to maintain that most approaches to requirements elicitation fall within hard-unitary and that the Scandinavian tradition with its emphasis on co-operative workplace democracy falls within Co-operative-Democratic. He concludes from this taxonomy that there is little work in the postmodern classification hence the research area with which he has become associated.

For Goguen it may be pertinent for his argument to consider an adapted taxonomy from Lyotard. But as was reported earlier in this document (section 2.3) other sociological classifications may have been used to categorise approaches to information systems development generally and not just to requirements. These would include Hirschheim and Klein (1989). As well as Lyotards other attempts to conflate sociological theory in this way have been considered in this document, notably Giddens (1984) in section 3.3. This does not invalidate Goguen's work, indeed much of the sociological basis for structures based in action directly corresponds with Giddens' work.

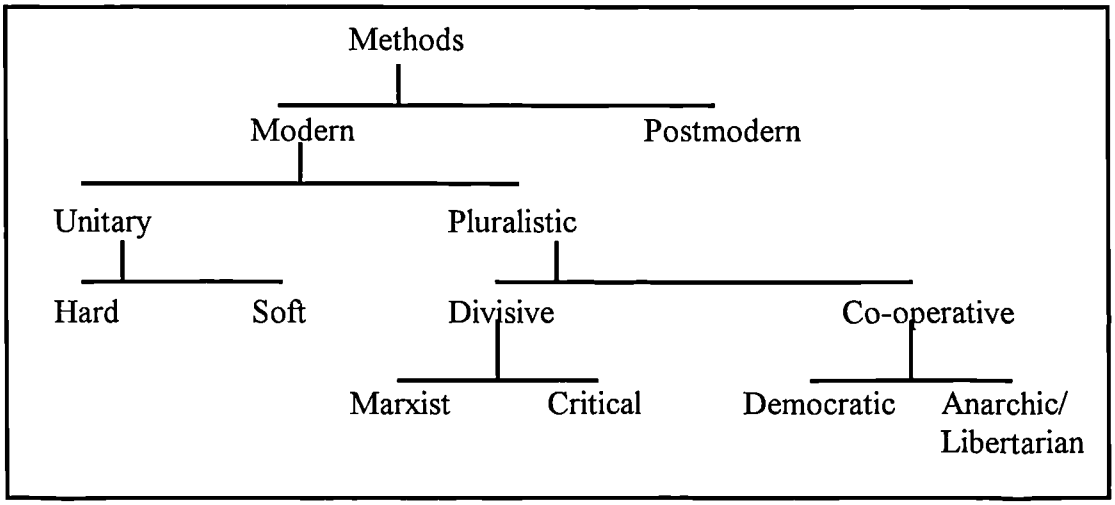


Figure 2.6 Lyotard's modified taxonomy for requirements methods (Goguen p.7, 1992)

The intention in presenting Goguen's work is to strengthen the argument for research into sociological methods for information systems development generally and requirements determination in particular.

Goguen maintains that the basis for the development of methods for requirements analysis associated with postmodernism is that

"Although natural language is often criticised for its informality, ambiguity, and lack of explicit structure, these features can actually be advantages for requirements. For example these features of natural language can facilitate the gradual evolution of requirements, without forcing too early a resolution of conflicts and ambiguities that may arise from the initial situation. Also natural language, possibly supplemented by graphics, is often the medium preferred by the individuals who represent the client" (Goguen, p.8, 1992)

and, also, in the view of the author, the preferred medium of the clients themselves.

Goguen points to work which has already indicated that natural language is more structured, and hence appropriate for structured analysis, than previously realised. In particular he identifies the work in object oriented analysis (Abbott, 1983) and that which demonstrates that task oriented descriptions can be translated into data flow diagrams (Goguen and Linde, 1981). However with respect to gathering good data upon which to base requirements, Goguen specifically points to ethnomethodology which

"can provide useful general guidelines for how to collect high quality data about social interaction" (Goguen, p.10, 1992)

He recognises that this may not apply to the analysis of data, although he recognises the benefit to analysts in having an understanding of the methods and concepts of 'members' (users).

The essential property, he notes, of his social data is that it is situated. That is to say

"it can only be fully understood in relation to the particular, concrete situation in which it occurred" (Goguen, p.10, 1992)

Much of the work in the area of situated action derives from studies made by Suchman (1987) and this work is considered next.

Suchman, an anthropologist, whist not explicitly concerned with requirements determination, makes an important contribution to this area because in trying to understand fields such as cognitive science and human computer interface she is

"dedicated to constructing accounts of relations among people, and between people and the historically and culturally constituted worlds that they inhabit together. The strategy of these latter investigations is to see what sense we can make of everyday activities if we view them as interactions between the acting person and those social and material circumstances in relation to which she or he acts" (Suchman, p.71, 1993)

and hence she largely draws on ethnomethodology (covered in section 3.2) as the sociological basis for her work. Therefore in using the word 'situated' Suchman is concerned with events that occur in some interaction which can only be fully understood in relation to the particular concrete situation in which they actually occurred. Goguen (1994) provides six points derived from Suchman's work which he considers to be the qualities of 'situatedness' and these are given in Figure 2.7.

This list whilst not a summary of section 3.2 of this thesis, nevertheless corresponds with much of the work in general related to ethnomethodology. In particular for requirements determination point 6 in figure 2.7 notes that in considering any situation much of the practical knowledge is unarticulated and therefore for an analyst the methods used for the analysis of the good quality data that ethnomethodology can produce is to determine (some of) the tacit grounded knowledge. This thesis is concerned with one such method - Grounded Theory - and this is also discussed elsewhere (section 3.2).

Vera and Simon (1993) critique Suchman's discussion of planning and situated action. They claim that Suchman implies that planning is irrelevant in everyday life and that her view of situated action suggests that it operates between the agent and the environment without the internal mediation of internal plans.

1. *Emergent.* Social events can not be understood at the level of the individual, that is, in terms of individual psychology, because they are jointly constructed as social events by the members of some group through their interaction.

2. *Local.* Actions and their interpretations are constructed in some particular context, including a particular place and time.

3. *Contingent.* The construction and interpretation of events depends upon the current situation (potentially including the current interpretation of prior events). In particular interpretations are subject to negotiation, and relevant rules are interpreted locally, and can even be modified locally.

4. *Embodied.* Actions are linked to bodies that have particular physical contexts, and that the particular way that bodies are embodied in a context may be essential to the social interpretation of some events.

5. *Open.* Theories of social events (both those constructed by participants and by analysts) cannot in general be given a final and complete form, but must remain open to revision in the light of further analyses and events.

6. *Vague.* Practical information is only elaborated to the degree that it is useful to do so; the rest is left grounded in tacit knowledge.

Figure 2.7 The qualities of situatedness (adapted from Goguen, p.168, 1994)

Suchman (1993) dismisses this since she maintains that rather than plans being irrelevant she recovers them from their given position to reopen them for investigation and mediation. With respect to the claims on situated action she argues that plans have a usefulness in selecting the next action and for combining sub-goals into strategies. Vera and Simon seem to (deliberately) misunderstand the perspective of ethnomethodology and treat it as a method as a substitute for plans rather than a methodology for understanding how actors make use of plans in situ.

2.5 IS Literature - summary

This chapter has reviewed the literature in the area of information systems. It began with an understanding of information systems as an emerging discipline with much internal debate surrounding its epistemological and ontological status. This is evident not least in the attention given to information systems

development methodologies and the classification of these. The chapter then considered the rôle of the analyst from a historical perspective focussing on issues for the present and likely rôles for the future. The chapter concluded with arguably the most difficult area of information systems, that being the determination of user requirements. Throughout the chapter it has been made clear that there exists within information systems an ongoing debate regarding sociological perspectives and this is most evident in requirements determination. It is also clear that there is a theoretical basis in the literature of information systems for studying an information systems development methodology which takes an explicit sociological perspective. This literature then provides the basis to add substantive empirical data to complement the existing theory.

In the next chapter the links that have been made from the information systems literature are explored in greater detail. It is important that although the two literatures have been split for the sake of readability, the perception is of emerging theory that is dependent upon both disciplines and which strengthens or confirms the boundaries of the discipline of information systems.

CHAPTER THREE

LITERATURE REVIEW - RELATED SOCIOLOGY

In chapter two references were made to the associated sociology theory methods and perspectives that integrate with and complement some of the emergent information systems theory. In this study the Grounded Theory methods and the perspective of ethnomethodology have been proposed as being a tenable methodology in determining requirements in information systems analysis. It is the purpose of this chapter to further elucidate the underpinning sociological literature in order that a fuller understanding can be derived for combining Grounded Theory and ethnomethodology. Furthermore the chapter examines structuration theory and its use in conflating the arguments surrounding the 'hard' soft' debate and as a consequence as a means of understanding the proposed linking of ethnomethodology and Grounded Theory without leaving the methodology open to the criticism of having an unsound methodological basis.

To begin with, it is worth reflecting on the problems facing any researcher in approaching a reference discipline. These were first considered in section 2.1. The problems facing an information systems researcher who is referencing the discipline of sociology is neatly summed up by Denzin and Lincoln (1994) who aim to address the problems facing any researcher in examining the field of sociological qualitative research.

"Three interconnected, generic activities define the qualitative research process. They go by a variety of different labels, including theory, method and analysis, and ontology, epistemology, and methodology. Behind these terms stands the personal biography of the gendered researcher, who speaks from a particular class, racial, cultural and ethnic community perspective. The gendered, multiculturally situated researcher approaches the world with a set of ideas, a framework (theory, ontology) that specifies a set of questions (epistemology) that are then examined (methodology, analysis) in specific

ways. That is empirical materials bearing on the question are collected and then analysed and written about. Every researcher speaks from within a distinct interpretive community, which configures, in its special way, the multicultured, gendered components of the research act" (Denzin and Lincoln, 1994)

It is the intention that the information systems community to which the author belongs may through the presentation of the literature have its boundaries more closely defined by theory rather than weakened by some arbitrary choice of methods poorly defined.

3.1 Ethnomethodology - a paradigm of inquiry

In this section the literature related to ethnomethodology is reviewed. Firstly there is a consideration of the historical context of ethnomethodology which is largely indebted to Schutz's social phenomenology (Schutz, 1962; 1964; 1967; 1970). The review then considers Garfinkel's (1967) contribution to the definition and establishment of ethnomethodology as a paradigm of inquiry and Goffman's (1959,1971) empirically grounded work in dramaturgical sociology (Adler and Adler, 1994) then some of the variants of ethnomethodology including conversational analysis (Sacks, 1972) and Silverman's (1985) Realist ethnomethodology. The section then considers a critique of ethnomethodologists (Ions, 1977; Waters 1994 p.52)). To bring the review into the realm of information systems this is followed by the use and proposed use of ethnomethodology in IS (Goguen, 1994; Suchman, 1987). The section concludes by indicating the relevance of ethnomethodology to this study.

Schutz (1964) introduced a set of tenets to the discipline of sociology that provide the basis for much of the later phenomenological, ethnomethodological and constructionist theory and empirical studies. He argued that the social sciences should focus on the ways that the 'life world', or the world that everyone experiences and takes for granted, is produced and experienced by members (actors). This subjective orientation led Schutz to examine what he called the 'common-sense' knowledge and the practical reasoning that

members use to objectify its social forms. He maintained that individuals approach the life world with a 'stock of knowledge' which is composed of common-sense constructs and categories that are social, and that these constructs and categories are applied to aspects of experience which makes them meaningful. The numerous phenomena of everyday life are subsumed under a more limited number of shared constructs. The shared constructs become the means by which members understand and interpret experience. Schutz (1967) argued that language is the central medium for transmitting meaning. Thus social phenomenology is based on the tenet that social interaction *constructs* as much as *conveys* meaning. As a strategy of inquiry his aim was a social science which would 'interpret and explain human action and thought'. This focused on how objects and experience are meaningfully constituted and communicated in the world of everyday life.

Garfinkel's ethnomethodology (Garfinkel, 1967) was not just an extension of Schutz's work but much more an alternative to the Parson's (1966) theory of action in which he maintained that social order was made possible through institutionalised systems of norms, rules and values. Garfinkel felt that this cast social actors as 'judgmental dopes' responding to external factors and motivated by internalised directives. His response was based on similar lines to Schutz (1964) that individuals had language-based and interaction-based competencies through which the observable orderly features of everyday life were produced. Garfinkel's (1967) ethnomethodology differs from Schutz (1964) social phenomenology in that the topic of study were the everyday procedures (methods) that social actors (ethno) used for creating, sustaining and managing a sense of objective reality. Ethnomethodological study focuses therefore on how actors accomplish, manage and reproduce a 'sense' of social structure. Ethnomethodologists focus on folk methods and common sense reasoning. Garfinkel (1967) described this as

"studies of practical activities, of common-sense knowledge, of this and that, and of practical organisational reasoning" (Garfinkel, 1967)

Since reality is produced by way of actors' interpretive procedures then the ethnomethodologists maintain that the actors' social circumstances are 'self-generating' which implies two important properties. Firstly that meanings are essentially *indexical*, that is they depend on context and it is only in the situated use in talk and interaction that objects and events become meaningful. Secondly the social realities are *reflexive* since the interpretive activities are both in and also about the social settings that they describe. Thus the focus for ethnomethodological research is the treatment of talk and interaction as topics for analysis rather than merely as a means of communicating some underlying phenomena. Waters (1994) proposes that for ethnomethodologists the only way in which sociologists can reveal the "facticity" of social experience is to approach it as would an anthropologist

"That is, the sociologist must seek to understand situations, in the terms in which participants give accounts of them, by calling to our attention the reflexive or accounting practices themselves. Sociologists must somehow induce participants to give accounts and thus to reveal the contextually rational properties of their social arrangements" (Waters, p.38, 1994)

Indeed the social anthropologist Erving Goffman is often associated with ethnomethodology. Goffman (1959) expresses social action in a dramaturgical sense and as such assigns roles to individuals who perform these roles in order to present a particular impression of themselves. He differs from ethnomethodologists such as Garfinkel since he considers the accounts that actors give as being too narrow a description preferring to include a wide range of other expressions such as body language, dress and so on.

Garfinkel however maintained the value of the account and proposed methods which explicitly sought to disrupt the continuity of reflexive behaviour in order to demonstrate that the stable social order is a constructed and fragile reality to which we all conspire and which may be undone. One example of this disruptive inquiry noted by Waters (1994) included field work in which the investigators acted like lodgers when living with their own families, and another in which the investigators attempted to overpay for shop purchases. Once the

required 'confusion' has been produced in the participant then they are required to give an account of the natural facts. Whilst this may appear extreme Denzin (1971) amongst others argues that ethnomethodology offers very real insights into the ways in which organisations work and especially those which process people, since comparable organisations differ in the way that they classify similar events and even in the ways in which they attribute meaning to particular words or phrases.

It is perhaps due to the extreme nature of ethnomethodology in its methods that gave rise to what Holstein and Gubrium (1994) describe as ethnomethodological contours. That is to say methods of analysis which are variants of ethnomethodology which share the common domain of talk and interaction as the basis for analysing social action. These include most prominently amongst them, conversation analysis (Sacks, 1972; Sacks, Schegloff and Jefferson, 1974) which focuses on the practices that speakers use and rely upon when they engage in 'intelligible conversation'. Heritage (1984) summarises the premises upon which conversation analysis is based. He notes first, that structurally organised interaction may be observed in the regularities of ordinary conversation and these structures are independent of the characteristics of the individual speakers. Second, that all interaction is contextually oriented, that is that talk is both a product of and reflects the circumstances of its production. Third, these two properties characterise all interaction. Analysis therefore focuses on the constantly emerging structure of conversation itself. The conversation is systematically examined for the structured ways that the orderliness of interaction is recurrently achieved.

Silverman (1985) proposes a Realist ethnomethodology which combines a traditional interactionist perspective with an ethnomethodological approach. In combining the two approaches he suggests that actors' accounts may be seen as 'displays of reality'. In considering the Realist view Silverman attempts to overcome the problem as he perceives it faced by many ethnomethodologists which is that the data is itself a subject of inquiry. Denzin (1971) also explicitly links symbolic interactionism and ethnomethodology in an attempt to meet the

issues regarding a consistent theoretical perspective that encompasses social-psychological and sociological problems and in doing so to aid in the understanding of how individuals 'are linked to, shaped by and in turn create social structure'. The dangers of linking these two perspectives are noted by Zimmerman and Wieder (1971) who point out that the proponents of ethnomethodology in fact claim it to be outside conventional sociology and hence synthesis with a sociological perspective is oxymoronic. Sharrock and Button (1991) shed some light on the basis for the disagreement by drawing the distinction that in its purest form ethnomethodology is concerned with the 'actor's point of view' and the ethnomethodological accounts reflect this. But the theoretician or analyst is interested in developing a generalised theory of social reality according to the empirical evidence from the actor's accounts. They maintain that

"The contradiction appears, however, only if one reads ethnomethodology in terms of someone else's dichotomy, that conventional one between 'hard' and 'soft ' data.....The point is rather that the tape recordings...[on their own] cannot adequately capture the nature of the very activities they record"
(Sharrock and Button, p.170, 1991)

In other words what is required is the situated or indexical character of the accounts which then stand as 'recognisable portrayals' of social occasions. Therefore it is for the theorists or analysts to make the distinction between 'individual action' and 'social order'.

Within this study and within the proposed use of ethnomethodology in the information systems field it is more often this *realist* ethnomethodology which is used since it provides for the analyst a paradigm within which the individual action can be studied and hence theory or generalised accounts generated which relate to the social order of the organisation. It is the use of Grounded Theory which provides the rigorous analysis to aid the analyst in presenting the social order.

The impact of ethnomethodology in information systems is most noted in the field of requirements elicitation and the ethnomethodological perspective is covered therefore in part in section 2.3 of this thesis. The impact of ethnomethodology into requirements determination is to be expected since as Goguen (1992) notes

"...it is likely that approaches quite different from the traditional systems analysis methods will be needed in order to take account of the social context in which computing systems are used" (Goguen, p.13, 1992)

Goguen (1992) maintains that an ethnomethodological approach can provide 'useful guidelines' on how to collect high quality data but recognises that this may not apply to the analysis of data. Goguen and Linde (1993) identify the limitations of elicitation techniques for requirements engineering based on ethnomethodology. These include that the techniques rely upon elicitation in context and rely upon the members own words. They express the opinion that the principles of ethnomethodology provide a framework for a deeper consideration of these limitations. They specifically recommend a 'zooming' method of requirements elicitation in which methods related to and including ethnomethodology can be used in the early stages of requirements elicitation to aid in the understanding of situated tasks actions with in organisations. Then they subsequently see these methods becoming less useful as the process of eliciting more formal requirements continues. They note that using ethnomethodology is expensive in terms of both time and money and they recommend the selective use on problems that have been determined as especially important. Button and Sharrock (1994) succinctly put the case for the use of ethnomethodology in requirements determination

"User requirements are contextually organised matters, and their intelligibility resides in understanding their relationship to a whole range of other work and organisational matters" (Button and Sharrock, p.239, 1994)

Of course ethnomethodology is not without its critics and Waters (1994) considers that ethnomethodology takes 'agency to its extreme'. He maintains

that the insistence on intentional human action which may avoid uncertainty and disorder means it is incapable of addressing large scale structures and processes.

Ions (1977) is much more ascerbic in his attention to ethnomethodology, which he considers to be a 'barbarous neologism'. He claims that ethnomethodology is based on a 'fictitious' theory of the use of language and is scathing about the use of indexical expressions since these are only one of a range of expressions used in ordinary language. He is also irked by the exclusive characterisation of people as actors fulfilling rôles since this single theatrical metaphor seemingly excludes discussion of elements of human interaction such as compassion and love. This resonates with Water's (1994) earlier criticism that at the extreme of agency the ethnomethodologists may be doing a disservice to people whose lives and personal exchanges with others can be much more richly described than simply in terms of the actions they perform.

In the context of this study however the ethnomethodology perspective has two main purposes. Firstly, to provide for the systems analyst a paradigm for inquiry. That is to say the philosophical nature of ethnomethodology and in particular the importance of actors' own words provide a basis for intervention in the problem domain. Secondly, in practical terms the ethnomethodological perspective provides for the collection of high quality data. It is therefore suggested that some of the criticisms of extremes may recede.

So far, this chapter has considered a perspective for the analyst's work in generating high quality data for analysis, namely the ethnomethodological perspective in the next section a method for the analysis of the qualitative data is considered, namely Grounded Theory.

3.2 Grounded Theory - a method of analysis

Grounded Theory or as it is more properly titled 'The Discovery of Grounded Theory' (Glaser and Strauss, 1967) is a method for the analysis of qualitative data. It derived as a means of formalising the operation of the principles of

analytic induction first suggested by Znaniecki (1934) and later elaborated by others such as Robinson (1951) and Denzin (1970). In this method conceptual properties and categories may be 'discovered' or generated from the qualitative data by following a number of guidelines and procedures. The procedures have evolved over the years throughout the research and experience of Grounded Theorists but the authors allow for this development as an aid to creativity. The two critical stages of Grounded Theory identified by Glaser and Strauss are firstly that of 'constant comparative analysis', a procedure for the identification of conceptual categories and their properties which may be embedded in the data and secondly what they call 'theoretical sampling' which is both a category enriching and disconfirming procedure.

Glaser and Strauss' (1967) original work had three main purposes. To offer the rationale for theory that was 'grounded' that is to say generated and developed through the inductive analysis of data collected during research projects. At that time this departure from traditional functionalist (Parsons 1964, 1966) and structuralist (Merton, 1963) theories which were largely deductive was a radical shift. The second aim was to suggest the procedures and the reasons for them and the third aim was to propose legitimacy for careful qualitative research. Interestingly the final aim has been achieved to the extent that Grounded Theory underpins many models of qualitative research (Dey, 1993).

The main application areas of Grounded Theory were most notably in Glaser and Strauss' own research into status passage (dying) (Glaser and Strauss, 1970), but also in a number of other, usually medical or nursing related areas such as: experiences with chronic illness (Charmaz, 1980); the management of a hazardous pregnancy (Corbin, 1992); homecoming (Hall, 1992). Additionally much work has been done with respect to guidance on the use of method. Most notable amongst them include: Turner, (1983); Martin and Turner, (1986); Strauss, (1987); Charmaz, (1983); Strauss and Corbin, (1990).

Grounded Theory differs from other approaches to the analysis of qualitative data because of its emphasis on theory. Strauss and Corbin (1994) maintain that theory consists of

"plausible relationships proposed among concepts and sets of concepts.....Researchers are interested in patterns of action and interaction between and among various types of social units (i.e. actors).....They are also much concerned with discovering process - not necessarily in the sense of stages or phases, but in reciprocal changes in patterns of action/interaction and in relationship with changes of conditions either internal or external to the process itself"

In reply to criticism that their definition of theory may be too austere or formal they note two important aspects of Grounded Theory,

"First, theories are always traceable to the data that gave rise to them...Second grounded theories are very 'fluid' because they embrace the interaction of multiple actors, and because they emphasise temporality and process" (Strauss and Corbin, 1994)

They stress that grounded theories are interpretive in their nature. This point will be referred to later in this section.

The method of Grounded Theory has spread to many other disciplines including research in information systems and Strauss and Corbin (1994) regret that the methodology now 'runs the risk of becoming fashionable', and they identify the main risks of this diffusion of the method as firstly the lack of conceptual development of processes and the over emphasis on open coding rather than theoretical coding which conceptualises how substantive codes relate to each other. They attribute much of this what they term 'misuse of method' to the overemphasis in the original (Glaser and Strauss, 1967) work on the inductive aspects of the method rather than the significance of grounded theories and on the importance of theoretically sensitised and trained researchers. In this thesis the author falls into the category of novice and this is considered again in the evaluation in chapter eight.

However the proponents of 'pure' Grounded Theory may consider that since the divisions amongst the original co-authors are so great that the differences in stress in the use of the method by others is only to be expected. This schism between Glaser and Strauss (Glaser, 1992) as to the focus of Grounded Theory is presented as a personal attack by Glaser and unfortunately this distorts the academic argument which simply put criticises the Strauss and Corbin's (1990) version of Grounded Theory as discarding the tenets of *emerging* theory which is the basis for induction and replacing it with *forcing* theory from pre-given or determined frameworks. For the purpose of this study it is the Strauss and Corbin writings that are taken as the latest 'version'.

Whilst Grounded Theory points to its roots in the interactionist tradition and the influences of Mead (1961) and Blumer (1962; 1969) it may be considered to be positivist rather than interpretivist particularly given the emphasis placed in more recent writings (Strauss and Corbin, 1990; Corbin and Strauss, 1990) on the reinterpreted scientific criteria that must be applied to Grounded Theory research in order to validate the research process. However Denzin (1994) maintains that more accurately Grounded Theory can be considered as post-positivist since although its proponents emphasise the 'good science' model it continues to fit itself to more interpretive styles. The author of this study considers Grounded Theory in this post-positivist way and agrees with Miles and Huberman (1994) who consider the post-positivist perspective to place an emphasis on multiple realities and researcher interpretation. Thus the use of Grounded Theory and the results produced may be said to be contingent upon the situation or domain under study. For this study this reinforces the use of ethnomethodology as a paradigm of inquiry. This is more in line with the constructivist criteria for quality of research which rely upon the richness or authenticity of the learning that is achieved and an understanding of the constructions of others, and on the ontological authenticity in terms of the development of the researcher's personal constructs (Guba and Lincoln, 1994). Indeed it may be argued that that there is a lack of concern in Grounded Theory studies for the origins of the data or how data should be generated or collected (Dobbie and Hughes, 1993). It may be possible to reject the inflated

view of Grounded Theory as a methodology given its epistemological flaws and perhaps consider it instead as a reliable means of data analysis. This methodological problem is dealt with in more detail in section 3.3 of this chapter where structuration theory (Giddens, 1984) is used to reconcile or more accurately conflate structures and agency.

The following discussion considers the impact of Grounded Theory on information systems research and also on information systems practice in the field of knowledge elicitation, and in these areas it is clear that Grounded Theory is treated as method rather than methodology.

In the information systems field little use has yet been made on the use of Grounded Theory as a research method although it is recognised as an emerging research method (MISQ, 1995). Amongst those that have used Grounded Theory as a research methods are Torasker (1991), Pries-Heje (1991) and Calloway and Ariav (1991).

Torasker (1991) uses a Grounded Theory approach to evaluate the product of information system design, in this case a decision support system. The evaluation is from an organisational and from an end user perspective. Since the method is relatively new in information systems much of the paper is given over to the research methodology in which Torasker (1991) identifies the major consideration for the use of a Grounded Theory approach. It is a response to the need for 'methodological pluralism' (Klein and Lyytinen, 1985) and a move away from traditional IS research methodologies which are largely causal-mechanistic (Klein and Hirschheim, 1983) and therefore inappropriate to gather user views. Torasker suggests that the alternative approaches such as the hermeneutic methods of analysis and prediction as used by Boland (1985) largely form the alternative research paradigm and that by implication Grounded Theory is of that alternative tradition. However from the discussion above it is clear that Grounded Theory as methodology rather than method is not hermeneutic. Indeed the post-positivist aspect of Grounded Theory is that the 'pure' grounded theorists maintain that if two teams of researchers using

Grounded Theory procedures were to research the same domain then the results would be identical, whereas a hermeneutic approach depends on the interpretation and involvement of the researcher and produces a 'certain reading' rather than one which would have been arrived at by any (trained) researcher. It is this departure from Grounded Theory as methodology which is key to its movement from social anthropology to information systems design. Torasker (1991) recognises the value of the method for analysis of qualitative texts, in this case produced by transcripts from structured and semi-structured interviews, and ignores the evaluation criteria as proposed by Strauss and Corbin (1990). He reaches this conclusion since in evaluating the study Torasker (1991) notes the lack of precision and reliability of results and yet these features are the important aspects of evaluation according to grounded theorists.

Torasker (1991) maintains the consistency of his methodological approach by adopting a hermeneutic approach in which Grounded Theory is a method of analysis rather than Grounded Theory being the paradigm for the research. However since this is implied rather than being explicit, Torasker's (1991) brief but pointed justification raises an important point about using methods from reference disciplines

"Therefore the possibility of using the GT approach for this investigation seemed methodologically promising and exciting"

Calloway and Ariav (1991) use a Grounded Theory based approach to explore how information systems designers perceive using design tools during systems development. In constructing the methodology they report that they used Grounded Theory as a method of data reduction combined with Content analysis (Krippendorf, 1980). They depart from the original proposed use of Grounded Theory in a number of ways. Firstly they combine the method with a positivist approach to research, content analysis. Secondly they begin with an initial set of categories or seed categories, which taints the inductive nature of the method and the reason given for this is to be able later to assess the generalizability of the study. They recognise however that,

"while the use of categories (or initial categories) suggested outside the study is useful, their application should proceed with caution. They should not suppress the emergence of new, at times even contradicting categories"

and yet there is no indication of how the researcher should 'proceed with caution'. Finally as with Torasker (1991) they do not attempt to use the evaluative criteria for Grounded Theory studies.

Taken together, and with Pries-Heje (1991), a number of general comments can be made about the use of Grounded Theory in information systems research. It seems clear that Grounded Theory is not being used in its 'pure' sense and has a resonance with the 'reference discipline' problem as noted by Adam and Fitzgerald (1996) and discussed in section 2.1. That is to say that the fears expressed above by grounded theorists relating to the diffusion of the method into other disciplines would appear to have foundation. Both Torasker (1991) and Calloway and Ariav (1991) have little regard for the methodological basis for Grounded Theory preferring instead to use the method as a rigorous method of qualitative data analysis. Similarly neither of the studies follow the evaluative criteria proposed. It may be said that the impact of Grounded Theory is to provide a new method in an alternative research approach and it is the approach which provides the methodological basis rather than Grounded Theory itself. There is also evidence of the use of Grounded Theory in information systems practice which similarly adapts the method rather than adopting it, and these studies are discussed below.

Pidgeon, Turner and Blockley (1991) use Grounded Theory for conceptual analysis in knowledge elicitation and they note that the Grounded Theory approach places a great emphasis on the detailed examination and cataloguing of qualitative data, as the first stage of developing rich conceptual models that accurately describe the data. This is important in the field of knowledge elicitation since none of the existing techniques such as repertory grid (Gaines and Shaw, 1980, Shaw and Gaines, 1987) or Bayesian elicitation procedures (Merkhoffer, 1987) address the problems posed in dealing with unstructured interview data. Their research uses the method for knowledge elicitation from

a number of domain experts, and in addition to providing a reliable method of analysis they note that the method is useful also in establishing a rapport with the expert and in keeping the expert interested. They maintain that this participative aspect is crucial to the success of the use of the method since constant comparisons of categories require the actors in the domain to confirm interim findings, and to elucidate specific parts of those findings and ultimately it is the actors who will validate the results of the method. They also identify a full set of outcomes from using the method, some or all of which may be later used as a resource for systems designers. The outcomes include core categories related to the data, together with their definitions, a large fund of theoretical memos, propositions that link categories and provide central relationships and graphical representations of the ways core categories are linked. The value of this work is that Grounded Theory is being used as a means of practical work since as Pidgeon et al. (1991) point out

The core of our argument is that the problems posed by the task of knowledge elicitation are essentially similar to those faced by social scientists undertaking qualitative enquiries" (Pidgeon et al., p.153, 1991)

They note that a range of social science methods could be used in this regard and that Grounded Theory is just one. But they do not indicate any criteria that they have used to select Grounded Theory for their work. Rather they present a table which maps characteristics of qualitative research against characteristics of knowledge elicitation. They do identify a major practical problem in the use of the method, that being that it is very labour intensive and requires a great deal of 'cognitive effort' and they do not recommend the method to novices. This recommendation has a resonance with the comments made by Glaser and Strauss about the need for trained researchers. For the author it raises an important question namely how does a novice train except in the use of the method? This thesis may be said to be such a training and hence the reflections on that process are important. This is revisited in chapter eight.

The authors are faithful to the Grounded Theory approach espoused by Glaser and Strauss (1967), reflecting the view of scientific activity as a modelling

exercise. They specifically note that the knowledge engineer is not given carte blanche to interpret the model produced but that the evaluative criteria constrain this interpretation and give rigour to the analysis.

Grounded Theory has also been used as a method of knowledge elicitation by Oliphant and Blockley (1991), in an engineering project concerned with the design of a knowledge based advisor on the selection of earth retaining structures. As with Pidgeon et al. (1991) they stress that the prime result of using the method is a hierarchical model, most generalised at the top and most detailed at the bottom, from which the rules of the system can be derived, although little attention is given to Grounded Theory as an appropriate method.

This section has discussed the derivation of Grounded Theory and its adaptation in information systems research and also as a practical tool for knowledge engineers. Its place in this thesis is significant since the studies use Grounded Theory as a method of qualitative data analysis. What is important is the extent to which the method is adapted and brought into practical use in information systems and whether Grounded Theory is method or methodology as discussed earlier in this section. The literature suggests that its use in information systems is as method rather than as methodology and as a result the question that remains is whether given its post-positivist perspective it is a tenable method in its interpretive style for information systems analysis. The literature suggests that the main barrier to its success has less to do with its philosophical basis and much more to do with the time required to perform the analysis. As argued in section 1.4.2 the ethnomethodological perspective will be sufficient to satisfy the former argument since it provides a definite ontological and epistemological view. In the next section consideration is given to structuration theory as a means to express the duality of ethnomethodology and Grounded Theory and to consider how structuration theory may generally be used to conflate the ideas of structure and agency which are expressed in the 'hard' soft' debate in information systems methodology in general. This dilemma was first identified in sections 2.1 and 2.2 of this thesis.

3.3 Structuration theory

In this section structuration theory will be explicated and its relevance to the study as a means of expressing the use of Grounded Theory and ethnomethodology as a tenable methodology for systems analysts. A criticism of the proposed linkage of Grounded Theory and ethnomethodology is that ethnomethodology is explicitly interpretive and Grounded Theory positivist. Whilst the latter has been challenged above this section leads to the expression of ethnomethodology and Grounded Theory as a duality rather than a dualism.

Giddens' work is unique amongst his contemporaries in that he seeks to explicitly link constructionist sociology with structuralist and functionalist arguments. His major work in this area is in three main texts, Giddens (1976; 1981; 1984). Giddens' premise is that constructivist sociology has established that the sciences of the human social world are different from those of the natural sciences by showing that human beings competently accomplish that world rather than it being pre-given. He recognises that the use of language is an essential element in this accomplishment because it is the usual medium by which meanings are shared. However he also points to some of the shortcomings of the interpretive sociologies in that they concentrate too heavily on the meanings at the expense of the material conditions of human life. That is they do not examine power differences and divisions of interest but concentrate on motives and reasons rather than causes. Giddens therefore separates the notion of agency from intention. He argues that when actors create society they do not start from scratch but draw upon pre-given resources. He identifies three kinds of such resources or modalities: meanings ('the interpretive scheme', these are the things known or the stock of knowledge), morals ('facility', the value systems) and power ('norm', these are patterns of domination and divisions of interest). Thus Giddens contends that structuration consists of these three modalities which connect aspects of structure with parallel aspects of interaction and these are shown in diagrammatic form in figure 3.1

Giddens insists therefore that agents and structures are in fact a duality, that is two aspects of a single phenomena rather than a dualism, that is two independent phenomena that might have causal links between them. Figure 3.1 indicates that when actors communicate they draw upon stocks of knowledge and in so doing they reproduce the rules of signification. These are the rules

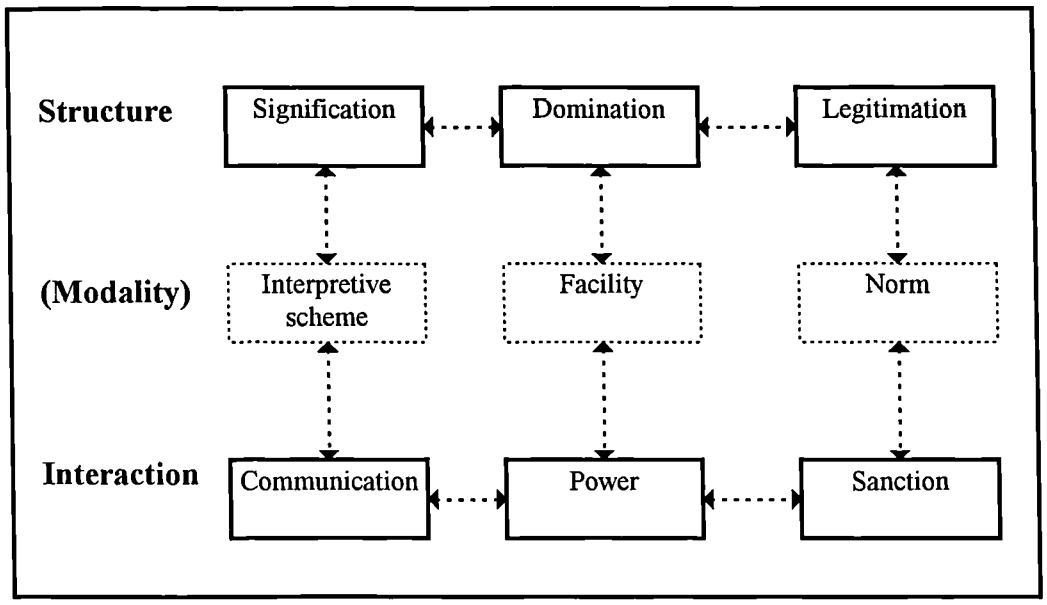


Figure 3.1 Giddens' diagrammatic representation of structuration theory (Giddens, 1984 p.29)

which connect signs with phenomena and with each other. When actors control others or accept control by others (power) they draw on resource facilities and thus reproduce structures of domination and subordination. Finally when actors either accept or reject the behaviour of others they draw upon norms which are rules of appropriate behaviour and in so doing they reproduce structures of legitimation.

Whilst structuration theory neatly and clearly establishes agency in the mainstream of sociological thinking Waters (1994) identifies a number of areas of criticism. Waters (1994) is concerned that

"Solving the problem of dualism by the use of the conjunction 'and' is common practice in Giddens reasoning. A repeated and pervasive example is that in which he argues that structure is dualistic because it is both enabling

'and' constraining. The terms not only have different meanings but actually contradict one another. The term 'enabling' presumably means offering a range of meanings, values and means within which the actor can choose in following a course of conduct. But presumably that choice must be limited, in other words highly constrained, otherwise there would be no sense in using the term structure" (Waters, p.53, 1994)

He also points out that this leads to the question of who does the choosing since

"If the actor is not separate from the structure, the ontological status of the freely acting individual must be in doubt." (Waters, p.53, 1994)

This points to a certain circularity in Giddens' arguments in that ,

"structure structurates action which instantiates and reproduces structure which structurates action and so on" (Waters, p.53, 1994)

Thus Waters (1994) concludes that Giddens may indeed have identified the problem of dualism in sociological theorising but may not have escaped the very theorising which has produced it.

However for the purpose of this study it may be sufficient to have identified the problem in order to find pragmatic ways around dualism. Vidgen (1993) for example uses structuration theory to express information systems methodology as a modality since the methodologies used form part of the stock of knowledge used to make sense of the participants' actions and that

"the activity of IS development (re)creates organisational reality but at the same time is constrained by the current structures of signification" (Vidgen, 1993)

He also notes the contribution of structuration to information systems research by such as Walsham (1993b), Orlikowski and Robey (1991) and also Sandoe and Olfman (1992) whom he quotes

"IS researchers explain their attraction to structuration theory as an exercise in void filling, making up for a dearth in rigorous theory in this, our fledgling discipline.....the discipline of IS bridges technical and social worlds, economics and politics, while structuration theory bridges many of the underlying concerns of our discipline (eg agency versus structure, material versus social etc)" (Sandoe and Olfman, p.129, 1992)

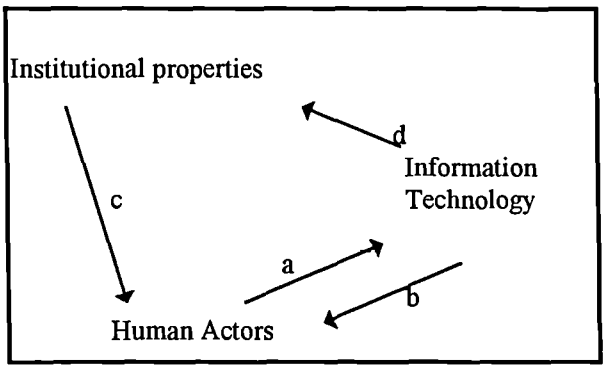
Orlikowski (1992) and Orlikowski and Robey (1991) present a structurational model of technology which guides two main areas in information systems research. The first is in systems development and the second is in the organisational consequences of using information technology. The basis of this model comprises

"(i) human agents - technology designers, users, and decision makers, (ii) technology - material artefacts mediating task execution in the workplace; and (iii) institutional properties of organisations" (Orlikowski, p.409, 1992)

This is described in diagrammatic form by figure 3.2.

Jones and Nandhakumar (1993) describe the application of the Orlikowski and Robey (1991) framework to the analysis of a case study of Executive Information Systems (EIS) development from which they make a number of points about structuration theory in information systems research. They identify three main issues. The first concerns the focus of structuration as an 'ongoing production and reproduction of social structure' and this draws attention to the issue of time, where they note that longitudinal studies, perhaps over decades may be needed to study these phenomena. The second issue is concerned with levels of context since research may be limited to the study of immediate levels of social structure and yet the greater influence on the human agent may be from wider social contexts. The third issue they identify is that of 'human agency' and the extent to which human agents can alter particular social structures. Jones and Nanhakumar (1993) argue that there is a need for both 'theoretical development and empirical research' to investigate such questions.

They conclude by noting that the value of structuration theory in information systems research is to use it as



Arrow	Type of Influence	Nature of Influence
a	Technology as a product of human action	Technology is an outcome of such human action as design and development, appropriation and modification
b	Technology as a medium of human action	Technology facilitates and constrains human action through the provision of interpretive schemes, facilities and norms.
c	Conditions of interaction with technology	Institutional properties influence humans in their interaction with technology, such as intentions, design standards, professional norms, state of the art in materials and knowledge, and available resources (time, money, skills)
d	Consequences of interaction with technology	Interaction with technology influences the institutional properties of an organisation through reinforcing or transforming the systems of signification, domination and legitimation

Figure 3.2 Structurational model of Technology (Orlikowski, 1992)

"a sophisticated approach with which to explore the rich diversity of the development and use of information systems in organisations" (Jones and Nandhakumar, p.495, 1993)

Walsham (1993b) and Walsham and Han (1991)describe structuration theory as a theoretical approach to conceptualising the linkage between context and process in social systems. Walsham (1993b) provides structurational analysis case studies to provide a deeper understanding of the theory as a broadly interpretive method of information systems research. Walsham stresses two further aspects of Giddens' view of human agency. Firstly he emphasises the distinction between practical consciousness and discursive consciousness. That is the ability to act in a knowledgeable way and the ability to explicitly describe actions and motivations. Walsham contends that structuration theory emphasises practical consciousness since

"human beings are viewed as being more knowledgeable than 'what they can say'" (Walsham, p.62, 1993)

The second and related idea he stresses is the routinization of most social action which explains the 'fixity' of social conduct and then the corresponding stability of institutions.

Walsham (1993b) analyses three examples of the use of structuration theory in IS research. Firstly he considers Barley's (1986) description of the installation of computer tomography scanners in the radiology departments of two different hospitals where the introduction of identical technology resulted in very different organisational outcomes. Barley (1996) also specifically mentions another key feature of structuration which is the unanticipated consequences of intended action. He describes how radiologists withdrew from the scanning process in order to discourage dependence of the technicians but he result was exactly the opposite.

In the second example Walsham (1993b) analyses Orlikowski's (1986) case study of the development and use of CASE (Computer Assisted Software Engineering) tools designed to increase productivity in a software consulting firm, and he notes how for example the action of the technical consultants involved in the development of the technology was influenced by existing institutional knowledge and norms with respect to the software development

process and also to structures of signification and legitimation and the intentions of management to exert control (domination) over the process. There may be some inconsistency here given Walsham's earlier position on practical consciousness since how can he claim validity for his analysis of Orlikowski's case study to produce *his* discourse. Surely Walsham's own point is that it is only Orlikowski's account that has validity.

However in his third example Walsham (1993b) notes that in addition to empirical applications, structuration theory can be used as

"a meta-theory within which to discuss and locate research on action and social structure in the information systems field which itself does not make explicit mention of the theory" (Walsham, p.67, 1993b)

To illustrate this he considers the use of web models and the institutional character of information systems as espoused by Kling (1987) and Kling and Iacono (1989). In considering action he uses the meta-theory to identify that the web models resource dependency corresponds quite closely with power/domination and the modality of facility but that less attention is given to communication and sanction. Then with respect to structure the meta-theory helps identify that Kling and Iacono (1989) 'view institutions as constraints' whilst structuration theory views them both as constraining and enabling.

For Walsham's own analysis of three case studies he notes that

"Structuration theory offers a subtle and detailed view of the constitution of social life, but the analytic dimensions of the duality of structure and its associated modalities could be considered as too detailed and complex for empirical analysis in some instances" (Walsham p.70, 1993b)

He considers that models of context and process are simpler and more tenable but nevertheless relate to structuration theory. He therefore uses the simpler models for his own case study analysis pointing out that it

"..is a matter for the researcher's judgement depending on the view taken concerning the additional depth of insight to be gained by using the more complex theory" (Walsham, p.70, 1993b)

For the purpose of this study structuration serves a major purpose in expressing the apparent dualism of ethnomethodology and Grounded Theory as a duality.

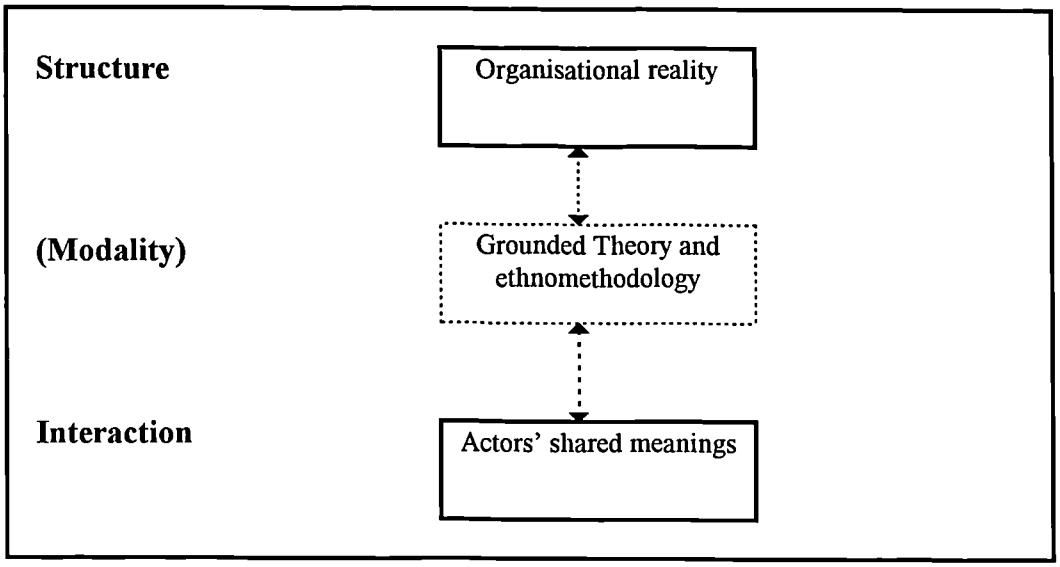


Figure 3.3 The use of structuration theory to express the duality of Grounded Theory and ethnomethodology.

This dualism was first highlighted in this thesis in section 3.2 since the literature would suggest that Grounded Theory may be considered as a positivist method by some and by others as post positivist which allows for an interpretive style. When considering the use of Grounded Theory within the paradigm of inquiry that ethnomethodology imposes, then this dualism may seem to be irreconcilable since ethnomethodology is very much an interpretivist paradigm. However structuration theory provides the basis for consideration of the use of ethnomethodology and Grounded Theory together as a duality (figure 3.3). That is to say that taken together and considered as a methodology structuration theory suggests that the methodology can be considered as a modality by which means the actors in an organisational setting share meanings and these meanings can be analysed through the methods of Grounded Theory to define an organisational reality which in terms of the methodology is expressed as the account of organisational life. It may be said then that the

proposed methodology helps situate the actors shared meanings and express them as organisational reality.

In this chapter three major areas of study have been covered, the perspective of ethnomethodology, Grounded Theory and structuration theory. What emerges is the essential background for the use of the proposed methodology as a *theoretically* tenable method. For the remaining part of the thesis consideration is given to the *practical* tenability of the methodology and therefore the next chapter considers an appropriate research methodology for evaluating the methodology in action.

CHAPTER FOUR

RESEARCH METHODOLOGY

In this chapter consideration is given to both the philosophical and practical aspects of method selection in undertaking the empirical research. The chapter begins with a review of the purpose of the study and then as a result considers the appropriate selection of methods, based primarily on Galliers' (1992) framework, and the basis for this selection. One important aspect of this study is the rôle of the researcher since the researcher acts also as the practitioner as it were, simultaneously. The research method needs to be able to resolve that apparent dilemma. Because of the use of computer software as a tool for qualitative analysis a review is given of this area of research. The intention is to provide a coherent, well justified and coherent strategy which is consistent in terms of philosophy with the area of study.

4.1 A review of the purpose of the study

The study is situated within the field of information systems. It is a matter of some debate in the literature to whether information systems can be considered as a discipline in its own right but this thesis is intent not on promulgating the confusion on this issue but rather addressing the issue by considering a sociological theory, structuration theory, which can help to prevent the bi-polar drift that exists in the discussion of methodologies in particular within this field. The thesis also builds upon existing Information Systems frameworks to strengthen the case for a discipline and elucidate the boundaries rather than extend the boundaries.

The motivation for the study is largely derived from the author's explicit sociological perspective which aligns with that of Giddens (1984) to agency theory in general and an explanation of structure through agency. Within the field of Information Systems this perspective is evident from a number of quarters but is perhaps best articulated by Walsham (1993b) and from the view

of requirements determination held by Goguen (1992). It is predominantly these three authors that have motivated the study.

The agency, or interpretive, perspective demands that consideration of techniques and methods be drawn from, or have relation to, the methods and techniques of the social sciences. This is because the natural sciences provide methods based on the perspective that there is a single given reality. Hence for a study concerned with the *social construction* of requirements rather than the *capturing* of requirements there is a conflict. This study aims to understand the process by which systems analysts may understand the construction of requirements in order to inform the design of information systems the study. To help with this understanding the author suggests a particular conjunction of methods. These draw upon a sociological perspective and a method for the analysis of qualitative data. The perspective of ethnomethodology is the sociological perspective for the gathering of good quality data, proposed as valid research by Goguen (1994) in a research agenda for future study. For analysing qualitative data the methods based on Grounded Theory are proposed. The Grounded Theory procedures are largely drawn from empirical studies, most notably by Pidgeon et al. (1991) and Oliphant and Blockley (1991).

The perspective of ethnomethodology in its 'purest' form is concerned with descriptions of everyday life expressed in the words of those actors (people) involved in it. It is an acceptance that the expressions of common sense made by the actors are sufficient as a research topic in themselves rather than the common sense expressed by actors being a resource which may be studied. However as shall be seen later the determination of requirements usually pre-empts the design of an information system and some tenable method needs to be used to analyse the data collected. The thesis proposes that Grounded Theory (Glaser and Strauss, 1967) is the basis for such a method since it broadly allows categories concerning the data to emerge and to be abstracted such that an account of the domain can be produced, or perhaps usefully a

hierarchy of inter-linked categories. It is this methodology that forms the basis for the empirical studies in the thesis.

Since the study is concerned with the researcher as a systems analyst then attention must also be given to the rôle of the systems analyst in studies of this type, and indeed in general. Further complications related to the rôle of the researcher in this context are dealt with below.

The research is presented as a learning process through the literature and the empirical studies. The original ideas were expressed by the author as co-author in Dobbie and Hughes (1993).

4.2 A taxonomy of research approaches

In this section consideration will be given to a taxonomy of research approaches in information systems (Galliers, 1992). The purpose of presenting the taxonomy is to propose a starting point for the selection and rejection of methods.

Galliers proposes a framework which can be used to identify appropriate research methods in certain circumstances although he stresses that the taxonomy is to be used for guidance and to stimulate thinking and not prescriptively to identify 'the right' method. It is in this spirit that the framework (Figure 4.1) was used. He proposes from the outset that it is reasonable to divide the research approaches into two categories which can be labelled 'scientific' and 'interpretivist'. He categorises the scientific approaches by their adherence to the scientific canons: repeatability; reductionism; refutability. The assumption in this tradition is that observations of the phenomena under investigation can be made both objectively and rigorously. Interpretivist approaches argue against the scientific ethos and Galliers identifies the three main arguments quoting Galliers, (1985) and after Checkland (1981)

Object	Modes for traditional scientific approaches (observations)					Modes for newer approaches (interpretations)				
	Theorem proof	Laboratory experiment	Field experiment	Case Study	Survey	Forecasting and futures research	Simulation and game/role playing	Subjective / argumentative	Descriptive/ Interpretive (including reviews)	Action research
Society	No	No	Possibly	Possibly	Yes	Yes	Possibly	Yes	Yes	Possibly
Organisation /group	No	Possibly (small groups)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual	No	Yes	Yes	Possibly	Possibly	Possibly	Yes	Yes	Yes	Possibly
Technology	Yes	Yes	Yes	No	Possibly	Yes	Yes	Possibly	Possibly	No
Methodology	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Theory building	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Theory testing	Yes	Yes	Yes	Yes	Possibly	No	Possibly	No	Possibly	Yes
Theory extension	Possibly	Possibly	Possibly	Possibly	Possibly	No	No	No	Possibly	Possibly

Figure 4.1 Information systems research approaches (adapted from Galliers, 1992)

"the possibility of many different interpretations of social phenomena; the impact of the social scientist on the social system being studied; the problems associated with forecasting future events concerned with human...activity [given the fact that] there will always be a mixture of intended and unintended effects and ...the danger of self-fulfilling prophecies or the opposite"
(Galliers, p.148, 1992)

In further constructing the framework Galliers considers the 'object' of the research for which he provides eight possible objects.

Galliers also makes the point that forecasting and futures research and simulation and game/role playing are difficult to categorise since they are dependent upon the underlying ethos when they are used. However this same criticism may be levelled for the whole framework and not just the research approaches Galliers chooses to identify. Indeed the framework provides little guidance for understanding the conceptual or philosophical basis of any of the research approaches. As a consequence those approaches which he terms 'interpretative' are difficult to classify precisely because they are dependent on a context and an intellectually well-framed set of ideas. However since few other frameworks exist it can be used -but cautiously.

Using this framework then for this study it is possible to consider that of the objects, or foci, of study the most likely candidate from the list supplied is 'theory testing' since the study will test the theory that methods from the social sciences are tenable in requirements determination phase of information systems analysis. It may be argued that the preferred object of study is methodology since the thesis is developing a methodology. However here again is evidence of a shortcoming of the Galliers' framework. The development of a methodology is not the focus of the research. Rather it is understanding the relevance of ethnomethodology and Grounded Theory in a process of requirements determination. The framework is useful in identifying that the 'theory' being tested is not a theory in the scientific sense, that is to say it would not be possible in the traditional sense to conduct a laboratory experiment (controlled outside of the organisational domain) or field

experiment(controlled in the organisational domain) since the theory is highly dependent on a sociological perspective, ethnomethodology, which demands that the research process and the theory being tested cannot be objectively separated. That is, there is no distinction in a scientific sense between the observer and the domain of study. For that reason it would be inappropriate to select traditional methods from the Galliers' framework. Of the approaches remaining only action research remains a firm candidate and this is discussed in detail below. However again action research is not wholly appropriate since the ideas for the intervention are not already established - they are being developed. For that reason the author chooses to use the term action case as expanded upon below.

The Galliers' framework also suggests that the descriptive/ interpretive approach is identified as a possible candidate although Galliers does not indicate why it is possible for theory testing. The descriptive or interpretive approach is usually equated with phenomenology and within the field of information systems with the work of researchers such as Boland (1985, 1991) and Boland and Day (1989). The strength of the approach is that phenomena (things) are the essence of our experience and that these are grasped intuitively and cannot be verified empirically, therefore the research process is one of continual questioning and refining of phenomena until they are well/better understood. The approach is highly reliant on the interpretation of texts (transcripts) to give meaning and understanding to the phenomena being described. It is questionable how this possible for any researcher without some contextual experience. For this study phenomenology does have some resonance however since within Grounded Theory the systems analyst interprets meaning aided by some practical guidelines of the method. Also the perspective of ethnomethodology has its basis in phenomenology. It is also the case that at the meta-level of understanding the study the researcher must enable meaning and understanding to emerge from a study of the phenomena described through the action case studies. However although phenomenology may at a meta- or philosophical level guide the researcher, and provide

consistency between the researcher and the research, the prime approach proposed by Galliers' framework is action research and this is discussed next.

4.2.1 Action research

In this section the term action research will be used to describe a research methodology appropriate to the study. The term action research implies large numbers of interventions over a (usually) extended period of time with a known set of ideas and the rationale for intervention well understood. In this study there are a limited number of case studies over a shorter period and the researcher is trying to understand a set of ideas and hence formulate a rationale for intervention. The use of the term action case in this study complements the use of the term as used by Vidgen and Braa (1997) who approach action case as arising from 'soft' case study which is essentially a method for *understanding* in which there may also be some limited *intervention* which causes change. It is used in this study from an alternative perspective in which intervention is planned and from which some understanding is gained about the conceptual framework in order that learning can take place. The term is also intended to convey that the learning may be achieved in a limited number of interventions. Each of the action cases addresses the theory under test and the audience is an academic community but also each individually is a practical systems analysis intervention whose audience is the sponsoring organisation. The two action cases provide two different contexts for addressing the theory which provides an extra dimension for consideration of the theoretical outcomes. The practical outcomes for each organisation are sufficiently answered in the single action cases. The fuller discussion of action research which follows helps to elucidate the principles upon which the action case method is based.

Perhaps the most disconcerting aspect of action research is the number of definitions and interpretations attributed to it. As Jönsson (1991) notes

"There probably are as many definitions of action research as there are authors on the subject" (Jönsson, p.374, 1991)

and rather than formulating another definition he proposes a definition based on that suggested by Argyris et al. (1985) which will also be the definition adopted in this study

"Action research is an inquiry into how human beings design and implement action in relation to one another. Hence it is a science of practice. Action research is when scientists engage with participants in a collaborative process of critical inquiry into problems of social practice in a learning context. The main feature of action research is that it is expressly designed to foster learning about one's practice and about alternative ways of constructing it" (Jönsson, p.374, 1991)

Checkland (1991) also notes the lack of a tight definition of action research and reflects that this is unfortunate since it is an approach which is heralded as an alternative to the positivistic hypothesis-testing scientific approaches and common definition would assist in preparing a defensible case. In an attempt to add clarity Checkland maintains that any piece of research has four essential elements shown in Figure 4.2. Namely, an area of application or domain (A), a particular set of linked ideas or framework (F) and a methodology (M) to investigate the area of application. The final element is the learning about the other three elements which may result in a change in each of the framework, the methodology and the area of application. The change in the area of application is most likely to result in action. There is an extra element not depicted in Checkland's figures but none the less important and that is the reflection by the researcher on the question 'Why am I intervening?'. Therefore for action research Checkland maintains that the researcher joins a real world problem situation and takes part in deliberations which lead to practical outcomes (a form of consultancy). It is important here to draw a distinction between the practical outcomes of action research, which are concomitant with theoretical outcomes, and pragmatism (Patton, 1990) which is driven solely by the success of intervention and has a strong management bias. In action research the researcher has a declared framework of ideas and a

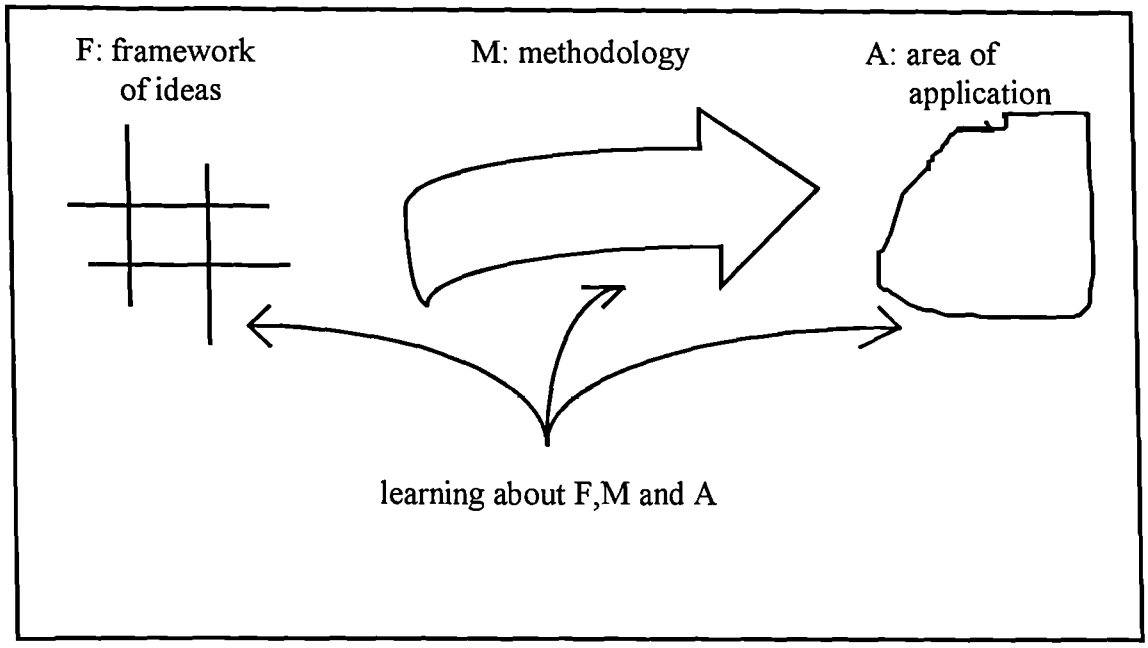


Figure 4.2 The elements of research (Checkland p.400, 1991)

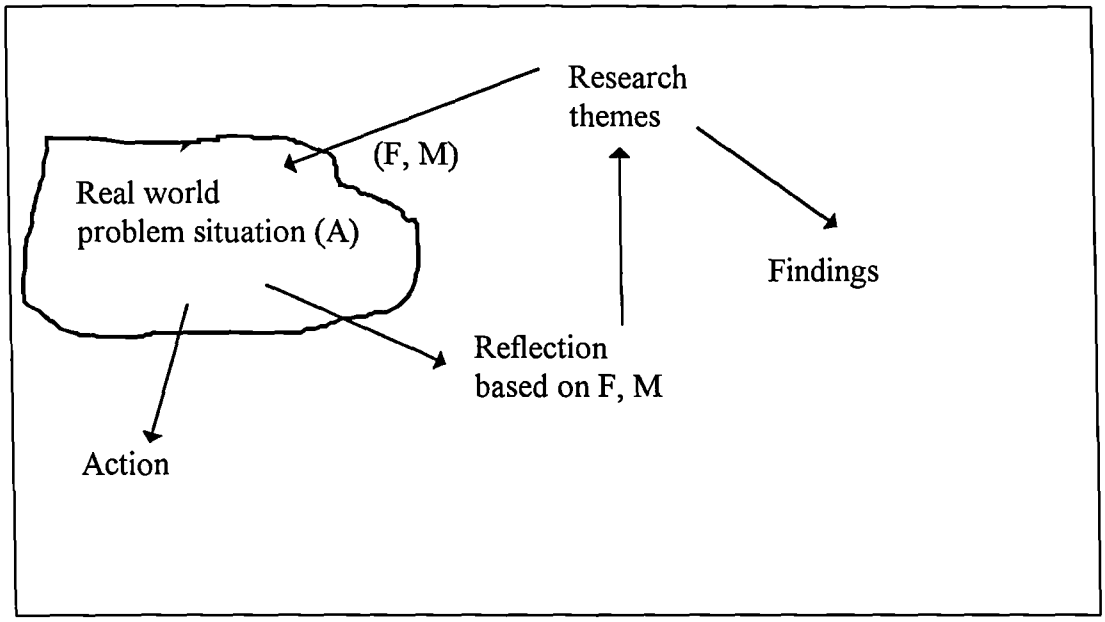
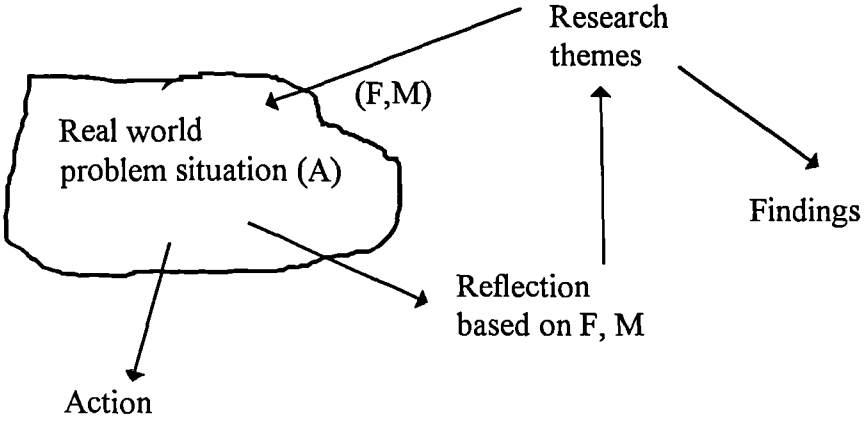


Figure 4.3 The cycle of action research using the nomenclature of figure 4.2 (Checkland p.401, 1991)



Research themes: i) using methods in information systems analysis more commonly associated with the social sciences
ii) implications for rôle of analyst
iii) a postmodern paradigm for requirements determination
iv) Information Systems as a distinctive discipline

F: using methods from the social sciences in information systems analysis for eliciting requirements

M: the three way conjunction of ethnomethodology, Grounded Theory and action case

A: 1. A veterinary practice
2. A small manufacturing company

Figure 4.4 Applying Checkland's cycle of action research to the studies undertaken.

proposed methodology which is intended to bring about the change in the practical situation. The outcomes of the action research can then be defined in terms of the action resulting from the intervention, reflections on and learning about the proposed framework and methodology and documented findings related to the research themes. This action research cycle is shown in figure 4.3. The application of the action research cycle to this particular study is shown in figure 4.4.

In the process described in figures 4.3 and 4.4 Checkland's view of the process is that initially the researcher will select a real-world situation which is

potentially relevant to the research themes. The researcher must then be both 'prudent' and 'careful' in negotiating the respective rôles of the researcher and the people in the problem situation and must 'declare' the framework of ideas and the methodology in which they are embodied. However there are some flaws with this seemingly transparent initial stage. Firstly action research does not necessarily imply the selection of the real-world situation. For some researchers it is the real-world situation that comes first, which may be in the form of a request from someone within an organisation such as Jönsson (1991). Thus the research themes become contingent upon the request. Also, where Checkland demands 'prudent' and 'careful' negotiation, it is unclear how this might proceed. Baskerville and Wood-Harper (1992) suggest that the rigour may be achieved by using Susman and Evered's (1978) five phase cyclical process which explicitly requires the establishment of a 'client-system infrastructure' or 'research environment' in the phase called diagnosis.

"The client-system infrastructure is the specification and agreement that constitutes the research environment. It provides the authority, or sanctions under which the researchers and host practitioners may specify actions and provides the legitimation of those actions as beneficial to the client or host organisation.....It must also patently recognise the latitude of the researchers to disseminate the learning gained in the research" (Baskerville and Wood-Harper, p.4, 1992)

Within this study the rigour of the action research is complemented by the rigour of Grounded Theory as a method of analysis as noted in section 1.4.2 and 3.2. and thus helps to mitigate the accusations of a carefree contingency.

Any action research project must also accommodate implicit agreements too and Jönsson (1991) recommends that details should be discussed with a view to reaching a situation of trust and mutual understanding amongst all parties. Taken together this important aspect of action research may be considered to be the ethical framework of the research. Walsham (1996) commends this as 'good' practice from an ethical viewpoint and extends the notion of collaboration to one of emancipation (Habermas, 1972) which recommends,

"a critical examination of existing barriers to emancipation such as authority and illegitimate power, peer opinion pressure and the bias and limitations of language in use" (Walsham p.77, 1996)

and he reflects on the rôle of the systems analyst/researcher as moral agent as discussed in this thesis in section 2.3.

Following the initial stages Checkland sees action research as advancing through the intervention of the researcher using the methodology based on the explicit intellectual framework. It is at this point that one of the tenets of action research is acted out. That is to say the researcher then engages in the rethinking of methodology and framework contingent upon the results of action taken. This is the learning element of action research and there are two important elements of this. Firstly that the learning about the framework and methodology results in immediate or indeed imperative action (Baskerville and Wood-Harper, 1996) and secondly that the learning that takes place is documented. This second point, as later discussed, is one of the key ways in which action research may be said to differ from consultancy - action research is interested in *process* and consultancy in *product*. Finally the researcher exits from the action research. At this point, following Checkland's figure 4.3, there may be considered to be three outcomes. Firstly, the intervention will have resulted in some action being taken which may be an improvement in the problem situation. The second outcome in terms of the research will be research findings. This is a problematic area since from the research it should be possible to make generalisable findings, since as Baskerville and Wood-Harper (1996) note this is what makes any theory relevant to a wider community of scholars and practitioners. The worst case may be that there is insufficient data generated to theorise from but as Gummesson (1988) notes when considering the validity of such research

"It no longer seems so 'obvious' that a limited number of observations cannot be used as a basis for generalisation. Nor does it appear to be 'obvious' any longer that properly devised statistical studies based on large numbers of

observations will lead to meaningful generalisations" (Gummesson p.78, 1988)

Thus Gummesson argues for validity as being a sounder criterion for generalisation than reliability, where validity is expressed as the degree to which the research might be said to have accomplished its intended outcomes within the inquiry paradigm that it was operating under. Therefore it is generalisable in the sense that the results are useful to future researchers.

The third outcome for action research is learning and this can be expressed in terms of the practitioners in the problem situation and the researcher. The researcher may have learnt about the problem situation and added to his/her experience and will also have learnt about the framework of ideas and the methodology. Indeed all learning will equip the researcher to modify these for future research. Argyris and Schon (1978) consider this in organisational terms to be 'double loop learning'. By this they mean that following some intervention in an organisation it is possible to learn about the domain - they refer to this as single loop learning. However the learning may also challenge the 'norms' or framework which were the basis of the intervention. They suggest that this could cause some conflict amongst managers who established the norms. Resolution of the conflict is what they refer to as double loop learning. In an action research sense, as discussed earlier, the learning from the framework, methodology and the domain are all important. Indeed as Reason (1994) notes double loop learning is critical to action research since without the reflection on the 'governing variables' it is possible for individuals to produce self-fulfilling systems of action which may lead to escalating errors.

There is a basic problem identified with action research and it is the problem of distinguishing between the rôle of researcher and the rôle of consultant. Gummesson (1988) quotes Schmid (1982) who states that,

"it seems that action science claims to unite research practice with the actions of practitioners and that this occurs ***without either form of practice predominating over the other.*** *Hence the action scientist professes a loyalty*

*to **both** knowledge **and** to the objectives of the practitioner...*" Action scientists "*...seek to integrate two essentially different forms of practice which inevitably produce contradictions, ambivalence and problems of co-operation. This combination of different forms of practice leads to the predominance of one form over the other i.e. places a limit on the operation of the other*" (Schmid, 1982, quoted in Gummesson p.102, 1988. Gummesson's emphasis)

This has particular relevance for this study since both pieces of action research described later were initiated as consultancies, and during the work the author was conscious of the need to separate (at least in the author's mind) the two rôles of consultant systems analyst and researcher.

Gummesson (1988) points to Sandberg (1982) as coming close to resolving the problem by replacing the action science with the concept of 'praxis research' where there is a separation between the rôles of researcher and consultant and also an interaction of the rôles. Sandberg (1982) distinguishes between 'reflection' and 'dialogue and action'. In reflection the researcher maintains a distance from the project in order to analyse it

"*...within a more general, long term framework and develop concepts, models, hypotheses, theories etc.*" (Gummesson, p.102, 1988)

and for reflection the requirements of the research are uppermost. In dialogue and action the researcher is involved in dialogue with the organisation and takes action in intervening in the domain but there is always an interaction between the researcher's reflection and his/her work for the client. The distinguishing characteristic is that for dialogue and action it is the requirements of the organisation that are uppermost.

Gummesson (1988) notes that action research is not simply a matter of finding consultancies and then deciding to use an action research approach nor that the finance is available. Rather he considers that the entry criteria needs to be that the organisation has a problem which gives the researcher enough scope to act.

Jönsson (1991) addresses the question of whether action research is nothing more than consultancy and maintains that under positivist assumptions action research is inappropriate and ought not to be considered because from a positivist perspective action research is seen as the 'application of accumulated causal/instrumental knowledge to specific cases' and as such is then 'mere' consultancy. He maintains that the difference from an interpretive (and indeed critical) perspective is the importance of the interpretive act and the subsequent publication of the conclusions. This may be considered to be somewhat simplistic since the framework of ideas *may* be positivist. What is critical is the that positivism implies independence on behalf of the researcher. It is the researcher independence and not the positivistic framework of ideas that makes action research inappropriate in those cases.

Baskerville and Wood-Harper (1996) identify four factors which they claim clearly differentiates action research and consulting:

"(i) researchers require more rigorous documentary records than consultants; (ii) researchers require theoretical justifications and consultants require empirical justifications; (iii) consultants operate under tighter time and budget constraints; (iv) the consultation is usually linear - engage, analyse, action, disengage - while the action research process is cyclical" (Baskerville and Wood-Harper, p.241, 1996)

To summarise the problems of action research it is worth considering the three dilemmas of action research as presented by Rapoport (1970). Firstly an 'ethical' dilemma of personal ethics and the goals of the research. Secondly a dilemma of 'goals' associated with social research between the subject under study and the means (science) of understanding the subject. Thirdly the dilemma of 'initiatives' which are the practical pressures that interfere with the research process.

With the advantages and disadvantages known it is the responsibility of the action researcher him/herself to undertake to reconcile the dilemmas and hence mitigate the problems. That can only be achieved by a deep understanding of

the method and (ironically) the experience of it in use (cf. section 2.2 of this thesis concerning the problem of information systems methodology in action).

Thus far the research methodology has been derived from Galliers' (1992) framework. It will be worthwhile to critique the framework further and also to consider an alternative from the information systems field.

A criticism of Galliers' framework is the exclusion of longitudinal studies, an omission which Smithson (1991) commented on when the framework was presented at the IFIP 8.2 conference on information systems research. Smithson (1991) maintains that the value of longitudinal research is highly productive of insights and to omit it because it does not fit the framework is 'unfortunate'. Whilst Galliers recognises the omission he maintains that the approach can be classified as any one of: case studies, interpretive/descriptive action and even survey research taking place over a long period of time. A further criticism is Galliers' position for case studies under 'scientific' approaches since this approach is widely used for rich contextual descriptions and as an aid to understanding phenomena in IS research, eg. McMaster et al (1994). It is worth iterating that case studies are not research in themselves, they are research approaches only when associated with a conceptual framework which is being analysed. On balance one might consider the Galliers' framework to be a practical guideline to IS research methods rather than an exhaustive or comprehensive theory based framework. An alternative to Galliers' framework is that proposed by Visala (1992) which seeks to extend the Ives et al. (1980) framework for considering research approaches in an attempt to overcome the gap between positivism and the interpretive research approaches.

4.3 A framework for guidance on research approaches

The Visala (1991) framework, figure 4.5, concentrates on ontological and epistemological issues. Visala (1991) maintains that

"Ontology means the assumptions about what phenomena make up the field. Epistemology gives the research approaches" (Visala p. 349, 1991)

and that the subject matter of information systems is such that it can be expressed in different 'conceptual contexts' which may include organisational, linguistic or technical, and that the question with respect to research approaches is what are the contexts that give sufficiently rich classification of relevant research approaches. He chooses to use the word 'horizon' instead of context and he defines horizons as,

Horizon	Approach	Definition	Limits
The instrumentally controllable world of nature and technology	Causal models (C)	model non-logical necessary relations	human acts cannot be explained causally
Purposeful acts of individuals and interest groups, the political 'game'	Teleological explanations (T)	practical syllogism	not all acts are due to conscious decisions
World of meanings, culture and form of life	Hermeneutics (H)	interpretation of alien meanings with pre-understanding	social structures are not purposeful but purposive
Social and economic structures	Dynamic structure models (eg cybernetics) (Y)	cybernetics	do not capture human intentions
The fuzzy horizon of unclassified observations	Statistics (S)	quantitative dependencies	do not penetrate pre-theoretic observations
Axiomatic description languages and their interpretations	Formal methods (F)	axiomatizable symbol systems	model idealized structures
Conceptual structures through which the world is given to us	Phenomenology (P)	purification of our concepts	subject to critical discussion

Table 4.5 Horizons, associated research approaches and their limitations (adapted from Visala pp. 351-352, 1991)

"...the contexts in which we see things in a similar mode of being (existing in the same sense of the word" (Visala p. 350, 1991)

and he gives as an example social norms as one mode of being which is different from the mode of being of, say, technical equipment.

He then considers seven research approaches in terms of their ontological 'horizons' and uses these to distinguish between research approaches and thus identify their limitations. A table combining the horizons, approaches and limitations is given in Table 4.5. For the purpose of this study it is worth considering two rows of the table. In the second row Visala considers a horizon 'purposeful acts of individuals and interest groups, the political game'. he suggests for this horizon the appropriate approach is teleological explanations. This study is concerned to some degree with purposeful acts and explanations for them as it is with the horizon on the next row - 'world of meanings, culture and form of life' - for which Visala recommends hermeneutics as being the research approach. This is useful in the sense that it engages the researcher to consider the philosophical basis of the research and not simply the tools to use.

From the table Visala then reinterprets the Ives et al.(1980) framework in order to associate the most appropriate epistemological research approaches with each of nine ontological levels or 'components'. This is presented in figure 4.6. The key elements are that the research approaches best suited to an individual component are shown where the same two components intersect on the diagonal. The intersection of components show how the interactions are most relevantly approached.

Whilst Visala states that the framework requires further elaboration one of the strengths is that it demonstrates that there is no 'grand theory' for information systems research and indeed very different research approaches may be appropriate to the same situation and vice versa.

The framework also makes quite clear the gap between the hermeneutic (interpretive) and the causal (scientific) approaches. Visala notes that the framework provides guidance on general research approaches rather than specific methods such as action research and suggests that in some sense the

effectiveness of methods could be measured to determine their appropriateness to general approaches.

Components:									
1.External environment	PHYS								
2.Organization environment	HTY	PHYT							
3.Development environment	HY	HYT	HF						
4.Development process	TH	**TH**	TH	TH					
5.User environment	HTS	HT	HT	H	HCS				
6.Use process	-	YT	YT	ST	TC	TC			
7.Operations environment	Y	Y	YT	T	C	C	CF		
8.Operation process	-	-	-	-	-	TC	C	CF	
9.Information subsystem	H	PTY	T	T	HT	T	C	T	HF
Components:	1	2	3	4	5	6	7	8	9

Figure 4.6 Research approaches to information systems (adapted from Visala p.356, 1991)

However examination of the framework would suggest that the relevant components of the research for the studies related to this thesis are 'organisation environment' which is component 2 in figure 4.6, and 'development process' which is component 4. The intersection of these two components from the framework suggest two general approaches for the study - teleological explanations and hermeneutics - indicated by the 'TH' and marked with asterisks for clarity. Visala suggests that together these

"...capture the fact that the development process must be interpreted in the light of various forms of life (H) [Hermeneutics] *in order to be understood as a means end procedure (T)* [Teleological explanations]" (Visala, p.357, 1991)

Given the epistemological nature of the research study described at the beginning of this chapter in section 4.1, and earlier in section 1.4.1, it is possible to reject the teleological explanations as an approach but to embrace

the hermeneutic approach. Within that general approach the use of action research as non-scientific is also justified.

The level of detail and the philosophical development of the framework distinguish it from simpler practical frameworks such as Galliers (1992). For this study the use of both frameworks have been useful in establishing and justifying an appropriate research methodology.

To complete this chapter on research methodology the next section considers the use of computers in qualitative data analysis.

4.4 The use of computers in qualitative data analysis

This section is concerned with the use of the computer and associated software in qualitative data analysis and the degree to which the use of such computer software is appropriate to this study. What will be discussed is software whose usual application area is to aid in the analysis of qualitative research data but which in this study was used for the analysis of data in a practical requirements determination exercise.

The major figure in the field of computer-aided qualitative data analysis was the late Renate Tesch (1990, 1991) who took the first steps to categorise software packages with respect to qualitative analysis approaches and to review the software available and its capabilities. More recent detailed software reviews come from Weitzman and Miles (1994), software selection guidance from Miles and Huberman (1994) and texts on methods and theory from Dey (1993) and Kelle (1995). For many researchers, particularly in the interpretive tradition, the idea of using computers at all for the analysis of text in the same way that they were used for numerical analysis seemed inappropriate and to some absurd. However as Kelle (1995) points out much of this hostility dissipated with the advent of the personal computer and the realisation that rather than taking over the analysis, the software could be a tool for organising and indexing text, in addition to providing support for some of the mechanistic tasks.

Specifically with respect to the use of software to support the procedures associated with Grounded Theory, Lonkila (1995) notes that it has influenced the development of several programs notably ATLAS/ti (Muhr, 1991,1993) and NUD•IST (Richards and Richards, 1991) and it has taken a central rôle in the second and third international conferences on computer-assisted qualitative data analysis held in Breckinridge, 1990 and in Bremen, 1992. Also in the special issue of Qualitative Sociology (Tesch, 1991a) on computer assisted qualitative analysis five of the nine writers make explicit reference to Grounded Theory. The reason for its popularity in respect of computer-aided qualitative analysis may either be due to the popularity of the method itself or to the ease with which it lends itself to software support. Whilst empirical evidence which might resolve this is unavailable at the time of writing there is evidence to suggest the latter. Lonkila (1995) analyses the connections between the main elements of Grounded Theory and computer assisted qualitative analysis. With respect to the coding process which is central to most programs she notes that the treatment of codes in NUD•IST is a much more complex process than is commonly associated with other qualitative analysis methods, and is closer to Grounded Theory in its treatment. Whilst other features such as linking, memoing and comparing are present in most packages, and whilst not specifically Grounded Theory related, provide a systematic means to keep track of what is going on. With respect to theory building both ATLAS/ti and NUD•IST have clear foundations in the Grounded Theory approach but neither are able to support the verification process as well as, for example, HyperRESEARCH (Hesse-Biber et al., 1991) and AQUAD (Huber et al., 1991). In summary, Lonkila (1995) expresses caution not so much over the use of packages to support analysis but over the possibility for the inexperienced researcher to be dominated by the available software in the selection of methods of analysis.

Kelle (1995) summarises the prevailing situation as an on-going debate between those who consider that extensive use of computers in qualitative analysis will inevitably lead to their use in the analysis task itself and not simply in text structuring indexing and manipulation, and those who consider that the

more powerful personal computers offer the qualitative analyst not simply a reduction in drudgery but new and innovative ways to deal with qualitative data such as Hermeneutic-Classificatory Content Analysis as proposed by Roller et al. (1995).

Within this study the author explicitly intended the use of the NUD•IST software as an aid to text structuring, indexing and storage in an attempt to significantly reduce the amount of time needed to perform these tasks manually. Although the author is acutely aware of the attraction of scanning for occurrences of data items rather than concentrating on the meaning and context.

This chapter has considered an appropriate strategy for the use of research methods in this study which will be consistent with the proposed methodology for requirements determination. The justification for an action case approach has been established and consideration has been given to the use of computers in qualitative data analysis. The next chapter considers in more detail the specifics of action case as a method in practice and explicates the detail of the methods associated with the combined ethnomethodology and Grounded Theory methodology of intervention.

CHAPTER FIVE

THE RESEARCH METHOD

In the previous chapter the general rationale for the research has been established. In this section consideration is given to the application of that rationale to the specific methods chosen. Therefore the following will consider for the action case design the methods for addressing: consultation with the host organisation; the three dilemmas of the action research process - ethical framework, goals and initiatives; the methods associated with ethnomethodology and Grounded Theory as the basis on which the author constructed a means of intervention for collection and analysis of data.

5.1 Consultation with the host organisation

For both of the action cases undertaken, at the HVP veterinary practice and at FP UK, specific attention in the design was given to explicitly distinguish for the host organisation the difference between the paid consultancy and the research. In order to facilitate the process of consultation a document outlining the terms of reference, the objectives of the research and the methods to be adopted was discussed with the key people involved. In each case this included not only those who sponsored the study but also those who would be involved with later joint intervention. The documents clearly defined the boundaries of the research, the point at which the research will be deemed to have finished and the means by which the results would be disseminated to the host organisation. During the time period of each study individuals sought confirmation and clarification of some of these points and in particular were concerned with anonymity - given the expected publication of results.

5.2 Resolving the dilemmas of action case

In chapter four three dilemmas of action research were identified (Baskerville and Wood-Harper, 1996) and each was addressed in the design of the action cases. The first dilemma is an ethical one and it is linked to the second, the

dilemma of personal goals in terms of likely research outcomes and the goals set in conjunction with the host to achieve successful outcomes from the intervention. It is important in this study particularly since the consultancies were paid for and therefore in a sense forced an output for the client. The problem for the researcher is to separate what it is that is desirable to do and what is acceptable to do. Given that the methods used come from the social sciences, and that this dilemma does not arise in research-only interventions in that field, it will be important to reflect on the distinction - this is done in this thesis in chapter eight.

Setting the research perspective for the client in the action cases for this study was done during pre-meetings with the host organisation. The researcher made it clear that the ethical basis for the research was based on the premise that organisational structures were constructed from the text, talk and interaction of the people within the organisation and it was for that reason that the methods to be used in the study had largely been adopted from the social sciences rather than from conventional computer science. There was no attempt to convert the sponsor, nor indeed to confuse, but it was important for the researcher that an understanding of the stance being taken was reached. One of the sponsors at FP UK expressed his frustration with expert advice given by computer consultants in the past where the objective was to sell technical solutions. He very much welcomed the opportunity to discuss alternative approaches. A final dilemma was the extent that the study was likely to predominate over the research. In order to mitigate this feature the researcher maintained a daily log which formed a reflective document in order that neither the study nor the research dominated future actions. The log also provided a structured means to annotate justifications for past action and reasons for future action. It is believed that this discipline added rigour to the study.

5.3 The procedures of data collection and analysis

In this section consideration will be given to the detail of the procedures associated with data collection and data analysis. Clearly as an action case

based study, the detail of the methodology pertains to the procedures and methods used in the first action case at HVP. Following the HVP case the learning that took place will be evaluated and necessary changes made to the methodology and the framework of ideas. The following is therefore expressed in terms of the design of the first study.

The collection of qualitative data in the ethnomethodology perspective is established by using the actors' own words and expressions as the data resource. To that end the data is collected using semi-structured interviews to tape. The structured element of the interviews is that the interviews are based on seed categories (Calloway and Ariav, 1991) which are the starting point for later analysis and which are broadly based on the agreed objectives and terms of reference of the study. The interview lengths cannot be fixed but generally are between 30 minutes and 60 minutes. Each interview is transcribed and experience (Hughes and Reviron, 1996) suggests that on average a 30 minute interview takes approximately 120 minutes to transcribe. The specific interview technique will follow the pattern whereby the researcher introduces the key areas that are to be covered and then for each area allows the respondent to discuss the area and if clarification is needed for the analyst then the interviewee is asked to clarify a phrase, word or expression. For example 'Why did you say..<phrase>?' or 'What do you mean by..<word>?' It is a key part of the data collection process that the analyst does not introduce concepts or lead the interviewee to make explanations in terms of the interviewer's own interpretation or analysis. Similarly the interviews will be transcribed verbatim and include pauses and interjections - for example for laughter. No attempt is made during the transcription to 'tidy up' the interview in terms of grammar or the use of colloquial expressions. Where groups act together in work situations then the interviews are carried out as far as possible with the group. In that particular situation the analyst allows respondents to cut across each other's answers and allows respondents to confirm and discuss their replies with one another.

Whilst the generation of transcripts is the major part of the data collection process, attention is also given to the collection of secondary materials. This includes documentation which gives some insight to the domain of the analysis. For example an organisation chart or a brief history of the organisation or the mission statements and objectives. Whilst these documents do not undergo the rigorous analysis described below they do provide the analyst with support materials which may be later used to help define or clarify analysis. One aspect of the NUD•IST software package, mentioned below, is the facility to store notes and memos relating to these secondary materials as off-line documents. That is to say their presence is noted but they are not transcribed and coded.

The basis of the data analysis are the procedures for the Grounded Theory approach. As discussed in section 3.2 Grounded Theory although initially articulated in book form by Glaser and Strauss in 1967 has essentially been an oral tradition and over time has been adapted to numerous situations that were largely unforeseen in the original work. For that reason the procedures discussed below are adapted from a variety of sources (Glaser and Strauss, 1967; Charmaz, 1983; Strauss and Corbin, 1990; Pidgeon et al., 1991; Calloway and Ariav, 1991). The procedures are expressed in diagrammatic form in figure 5.1. The design detail was also influenced by the selection of a software package for the data analysis. The QSR NUD•IST (Non-numerical Unstructured Data (Qualitative data) Indexing, Searching and Theorising) package (QSR NUD•IST, 1995) and the discussion regarding the use of computers in qualitative research is in section 4.4 above.

The procedures for analysis are not a step by step process. The richness of the analysis is that the discovery of theory and the elucidation of categories requires that as soon as the first transcript is produced it can then be coded and perhaps the first categories can emerge. As further transcripts are produced then they are coded and simultaneously compared with the pool of transcripts already coded. The overall intention of the analysis is the progression by analysis towards a final 'theory' or account of organisational life. Therefore both the collection and analysis of data are parallel activities.

The main elements of the analysis activities are: memo writing; coding - open, axial and selective; theoretical sampling; comparison; evaluation. These are described below.

5.3.1 Memo writing

Memos are written elaborations of ideas about both the data and the coded

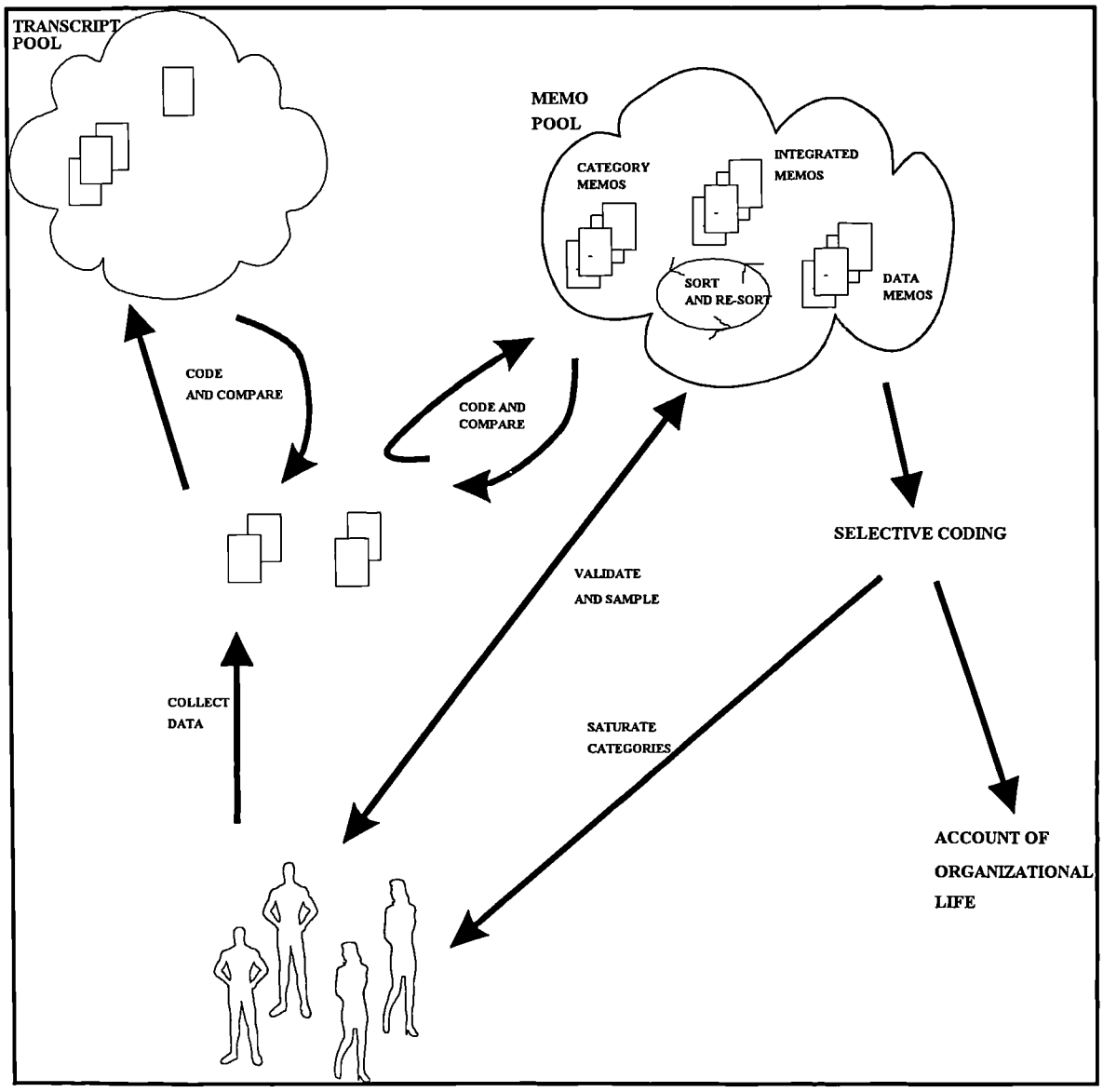


Figure 5.1 Procedures associated with Grounding Information Systems

categories. They connect the analytical framework which is constructed through the categories as the analysis progresses to the later finished account.

Memo writing takes place throughout the analysis. It starts with memos about the individual interviews and proceeds to memos about the categories as they develop and then about the links between categories. The building of memos avoids the collection of a mountain of unanalysed data waiting to be analysed and instead directs data coding. Additionally the memos provide the interim documentation which can be returned to the respondents to validate categories or relationships amongst categories. The sorting and resorting of memos is critical to the method. The analyst must relate memos that relate to the same category in order to clarify it and also in order to distinguish it from other categories. As the analysis proceeds the integration of memos moves towards the final account and it is through the memos that the integrated framework of categories and sub-categories are documented. Miles and Huberman (1994) provide advice on memos, which is largely drawn from Glaser (1978) and Strauss and Corbin (1990), and although lengthy is an excellent guide to the method.

- Always give priority to memoing. When an idea strikes, STOP whatever else you are doing and write the memo. Your audience is *yourself*. Get it down - don't worry about prose elegance or even grammar. Include your musings of all sorts, even the fuzzy and foggy ones. Give yourself the freedom to think. Don't self-censor.

- Memoing should begin as soon as the first field data start coming in , and usually should continue right up to the production of the final report. Just as codes should start to stabilise reasonably well by one-half or two-thirds of the way through data collection, the ideas raised in memos usually will start settling down then or shortly afterward, as the analyst approaches 'saturation' (no significantly new explanations for data). Memoing contributes strongly to the development/revision of the coding system.

- Memos are about ideas. Simply recounting data examples is not enough. By the same token memos are not chiefly about people or

events or interactions; these are all used as indicators for an analysis that is set in a conceptual frame.

- Don't standardise memo formats or types. Memoing styles are distinctive, and memo types are as various as the imagination can reach.

- Memo writing is fun. It often provides sharp sunlit moments of clarity or insight - little conceptual epiphanies.

5.3.2 Coding

The coding of transcripts, ie the data resource, is the basis of the analysis. Prior to discussing the three major coding types in Grounded Theory - open, axial and selective - it is worth considering coding in the light of the qualitative research methods upon which it is based. Miles and Huberman (1994) consider the coding process as not so much an interest in the words or phrases but in the meaning that is conveyed in a context. Codes should be considered, as discussed in section 3.1, what Garfinkel (1967) calls 'indexical expressions'. That is, they are dependent on a context and it is only in the situated use of text talk and interaction that they become meaningful. Codes are therefore used to retrieve meaning from transcripts although in the early coding of transcripts the meaning may remain unclear even to the analyst. Having coded a transcript then organising the codes with respect to each other enables the categorisation of codes. In a deductive method the categorising helps to pull out codes that correspond to a particular research theme or hypothesis. In an inductive method such as Grounded Theory the analyst is more open minded in the production of categories and is more context sensitive. The essential elements of this as described by Strauss (1987) and Strauss and Corbin (1990) are to review each line of text within the transcript and to code a specific phrase or word relating to an incident or observation or process - at the early coding stages the use of in vivo codes is strongly encouraged - and a list grows of codes. The in vivo codes are the precise words or phrase used by the respondents rather than the analysts' summary words or phrases. When the first coding is complete the list of codes are reviewed and then typically a more

abstract category is attributed to several codes. These categories then form a more abstract picture of the data. The use of a software package such as NUD•IST at this stage enables a tree structure of categories to develop which contain the instances of the codes that will later contribute to filling the dimensions and properties of the category. As the production of transcripts and the coding continues then the analyst can not only identify new codes, but also, because of the experience of coding and creating categories in this context, can directly attribute codes to categories as the transcript is being coded. Clearly not all codes will survive and others will flourish. Therefore one important aspect of the coding/categorising process is to promote categories that become more abstract and to demote into sub-categories those which are less abstract. The analysis may be said to be over when all categories have been 'saturated'. That is when transcript coding no longer adds to the dimensions or properties of the categories. It is also considered to be over when a 'core' category or categories have been established as being the most abstract representation of the data.

One aspect of coding and categorising from transcripts is the rôle of the analyst in determining what to code and how that code may be related to another or be part of a category. Coding is essentially a hermeneutic process and it is therefore important that it does not become too introspective. For that reason the use of memos as described above helps to elucidate the reasons for clustering codes into categories and for linking categories together. Thus the building up process can be discussed with participants for validity. Glaser (1978) defines the memo as

"the theorising write-up of ideas about codes and their relationships as they strike the analyst while coding.....it can be a sentence, a paragraph or a few pages....it exhausts the analyst's momentary ideation based on data with perhaps a little conceptual elaboration" (Glaser p.83-84, 1978)

Thus the creation of memos and the creation of codes and categories can be considered to be an integral process. The NUD•IST software assists in this

process by enabling the analyst to interchange coding and memoing without losing track of place in a transcript.

It is worthwhile now to consider the specific coding types associated with Grounded Theory

5.3.2.1Open or initial coding

The initial or open coding begins as soon as the first transcript is prepared. The coding at this point is fairly unrestricted in the sense that each line of the transcript is scrutinised and sometimes each word of each line to produce a code which at first may seem almost to be simply repetition or summary of the text. The purpose is to 'open' the inquiry into the data and at this stage any part of the data may seem relevant and if it is not then later it can be discarded. At this early stage some surprising codes begin to emerge from seemingly uninteresting text.

The NUD•IST software assists the analyst at this stage by building a single level tree structure with each node being he initial code. Thus the analyst can prepare a memo on the first transcript which details the context and person or people involved, and additional memos on each of the codes to give initial reasons for finding them worth reporting. At this stage not all codes will have associated memos.

As the open coding continues through to other transcripts Strauss (1990) suggests that attention should be given to asking the question of each code 'Which category does this incident or phrase or process indicate?' As the number of categories increase and the tree begins to take a more hierarchical form then this question becomes easier to answer and can be extended to include the question 'What part of the emerging theory does this incident indicate?'. The purpose here is to stop the analyst becoming too lost in the richness of the data presented and focuses on forcing the generation of codes that relate to other codes.. Finally the analyst must always ask 'What is happening in the data?'. Ultimately this final question will assist the analyst in

'telling the story' that emerges from the data and therefore also assist in elucidating the core category or categories.

The analyst can now take a limited set of codes from the initial coding and apply them to larger amounts of data. This forces the analyst to carry out analysis and identify *categories* not merely labels. The categories are formed from groups of words from the initial coding which pertain to the same phenomenon. Categories are at a higher level and more abstract than the concepts they represent. The concepts must be *repeatedly* present in the data to warrant the abstraction to the level of category. The analyst may select both in vivo categories or the analyst's own categories. The categories are generated through the same analytic process as that above of making comparisons to highlight similarities and differences. For the process to be rigorous the analyst must go back through the currently available data and re-code in relation to the new categories. A category can only achieve its status if the analyst identifies *properties* for the categories which define: its characteristics; the conditions when and where it develops; the consequences it produces.

Analysts may then use their knowledge of the domain or their previous experience, to expand and clarify codes to sensitize themselves to ways of further exploring the data. It is imperative that this alternative source of comparison and questions are not used as a measure of the truth, since that is something which only the data can provide.

Once categories begin forming then it is imperative that each category has an associated memo which elucidates it and relates it back to the data.

5.3.2.2Axial coding

In this process categories are related to their sub-categories, and this relationship is tested against the data. It also includes further development of categories and the continuation of the search for them. This process of development of categories and sub-categories necessitates the collection and

further analysis of data. The analyst may need to return to a respondent to clarify or elucidate quite specific points in order that a category is *saturated.* Saturation of a category occurs when the collection of data and its analysis can add no further to the properties of the category. Categories may also be related to each other to provide an integrating framework.

During axial coding the memos will now be developing the properties of categories and the relationship with sub-categories and in particular the integration of categories and the relationship between them.

5.3.2.3Selective coding

This is the process whereby all categories are unified around a *core* category, and categories that need to be explicated further are 'filled in'. This usually occurs in the later stages of an investigation. The core category represents the central phenomenon of the study and it is important that it is arrived at although the path to selecting it may be very difficult. In the later stages of an investigation the analyst may have identified several schemes that can link the data together. What is important is that a central category is arrived at and this can be achieved by abstraction or generalisation. Indeed the more abstract the core category then the more widely applicable it can be said to be to the organisation. The 'filling in' of poorly developed categories is done at this stage, in order that all categories in the final integrative framework of categories are saturated. The memos at this stage are likely to be more elaborate and should themselves be integrated, since they will form the basis of the final written account.

The memos that relate to the fully saturated categories at this point will be quite lengthy and will indicate completely the dimensions and properties of the category and also the reasons for considering the category to be saturated. At the most abstract level the memo associated with the core category should indicate the nature of the integrated framework of related categories and the reasons for the choice of core category.

5.3.3 Sampling and comparing

The two analytical techniques of theoretical sampling and constant comparison are the means by which the Grounded Theory proceeds. These techniques relate the coding activities to the pool of data and memos that already exist.

Theoretical sampling is an inductive technique which is used when the data do not exhaust the theoretical category that is being developed. The analyst must return to the domain until categories have been saturated. That is to say the analyst must sample particular categories to ascertain that its properties can not be elucidated further. Specific detailed questions need to be asked of participants related to the category that has been induced. This checks the scope as well as the depth of a category. Strauss (1990) makes the distinction between sampling as used in quantitative research, sampling in qualitative research which is purposive and prespecified and sampling as used in Grounded Theory. The theoretical sampling in Grounded Theory is theory-driven and Strauss (1990) emphasises that the grounds which decide what people, events or activities need to have further data collected on them are analytic grounds based on the emerging theory.

As has already been described, as each new incident or concept emerges it needs to be compared against existing concepts and categories for both similarities and differences. The purpose of this is essentially threefold: to ensure as far as is possible the analyst's neutrality by constantly challenging him/her with new data; to help achieve greater precision in grouping together like phenomena and then to further subdivide concepts which are variations on the first; to ensure consistency in grouping like with like. The analyst must always look for patterns and variations and identify *process* where it occurs. Strauss (1990) stresses the importance of this constant comparison by saying that concepts and their dimensions 'earn' their way into the theory.

5.3.4 Evaluation

The outcomes from the analysis may take a number of different forms but will usually include a written account of the domain which identifies the core category, its properties and dimensions and its relationship with other categories. This will include reference to memos which indicate how the core category emerged and how the theory can be justified in terms of the data. This will be supplemented by a hierarchical diagram which depicts the integration and relationships of the categories. There may additionally be alternative graphics or diagrams to aid the understanding of the categories and their relationships. Strauss (1990) suggests the use of integrative diagrams which show the path taken to the final hierarchical diagram. He offers this as a measure of validity to demonstrate how the integration is based on the data. The final outcome should also be a prediction based on the findings which is intended to inform later activity in the domain. In the case where this is used in information systems analysis the purpose here is to inform the later stages of analysis and design.

Clearly the use of any method must be subject to quality control and the evaluation must answer the question 'How can I vouch for the validity of the results?' Pidgeon et al. (1991) point to a particular strength of the Grounded Theory approach, namely that the approach itself is a documented record of the progress that has been made and a documentation of the analysis that took place through the memos. Additionally using the ethnomethodological perspective, as Dobbie and Hughes (1993) point out, generating transcripts in the actors' own words provides reliable data. Furthermore validating interim findings with the actors in the study and returning to the actors to saturate categories provides the ongoing control that the theory being generated is grounded in the domain. Using the NUD•IST software the record is structured and has a consistency which makes the analysis accessible both to other analysts and if necessary to the actors in the domain.

One practical problem with the method as noted by most authors on the subject is the labour intensity and the time taken to perform the collection and analysis.

Although two practical steps might be used to overcome this, the first being the identification of seed categories prior to the data collection and the second the use of a software package, nevertheless it remains the major obstacle to possible adoption of the method. It should also be remembered that the methods described above are based almost entirely upon the use of Grounded Theory as a research method. In this study Grounded Theory is being used as a method to be used by practising systems analysts and therefore constraints on time become even tighter.

The methods and procedures as described here are those used in the first of the action-cases documented in chapter six. The lessons from the first intervention will then necessitate changes to the procedures and methods which will be documented and then used for the second action case in chapter seven.

Following each of the action case studies an analysis in terms of the learning that took place is presented in which the practical and theoretical problems are revisited in terms of the framework of ideas and the methodology used.

Thus far in the thesis an argument has been developed and literature reviewed which leads to the *theoretical* basis of ethnomethodology and Grounded Theory as a tenable methodology in requirements determination. A research methodology has also been selected which complements the study from a philosophical an practical point of view. In the following chapters the *practical* application of the methodology is put to the test and evaluated.

CHAPTER SIX

THE ACTION CASE STUDIES - THE HEATH VETERINARY PRACTICE (HVP)

In this chapter and the next, two action case studies shall be described. The first case is Heath Veterinary Practice (HVP) and the second FP UK. In both cases the actual names of the organisations have not been used. The format for presenting the work will be to describe the general context of each of the cases and then to describe the means of intervention and the agreed terms of reference and design. This will be followed by a presentation of the cases as an account of organizational life as generated through the Grounded Theory methodology and hierarchical diagrams which identify the core and sub categories which emerged from the data and the means by which they are inter-related and integrated. This will be followed by a discussion concerning the learning that took place as a result of the intervention and the consequent recommendations for change to the framework of ideas and the methodology. At the end of this chapter, prior to the methodology being applied in the second of the action cases, the framework and methodology will be shown to have changed.

6.1 An overview and historical perspective

HVP is a three site practice in a city in the East Midlands. One site, SL, is in the city centre and the others W and G are situated 5 miles south and 5 miles north-west of the city centre respectively in large village locations. The Practice is a mixed practice in that it does both small animal and farm animal veterinary work. The Practice is a partnership with four equal share veterinary Partners (Iain, Peter, Andy, Stuart) one salaried Partner (Gareth - salaried means that he has yet to buy-in to the practice but shortly will do this when the financial circumstances of the practice allow and when the other Partners consider it timely), four full-time veterinary assistants (Brian, Tudor, Wendy, Jane) and two part time veterinary assistants (Wieneke, Hilary). There are

thirteen practice receptionists including a reception supervisor at each site and eleven nurses including a nurse supervisor for each site. Additionally the Practice employs out of hours telephone receptionists who usually are the partners of the vet on call. The general management of the Practice is through the Partners assisted by a full time Practice Manager (Sandra) and a Practice Accountant (Pam) both of whom sit on the practice management team. Additional administrative support is provided by one accounts clerk based at SL and one administrative assistant for the Farm Office which is based at the W site.

The history of the HVP dates to the beginning of the twentieth century when a single vet ran the veterinary practice from his house using a pony and trap to visit the farms. His son joined him in the practice and they moved to new premises in the city in the 1920's. At this point a third vet joined the practice. There was a rapid expansion shortly after with the increase in both small animal and farm work and two further vets joined the practice. The practice remained a stable five vet partnership until the 1960's with the retirement of one of the Partners, another leaving the area for family reasons and a third moving into semi-retirement on the South Coast. Rapid changes followed as other vets moved into the practice and the practice relocated in 1965 to the SL site to give better access by car and better accommodation. When the last of the original partners retired in 1975 the practice split and the site at SL became a two partner practice, and later in 1979, a three partner practice which was the basis of today's practice. The G site opened in 1981 and the latest of the changes, the move to three sites, took place in 1995.

The way the three sites now function is partially historical and partially planned in the light of particular specialities that the Partners have. The newest of the sites, W, was intended to relieve the demands being placed on SL in terms of both moving some of the small animal client base and having a purpose-built centre for the farm work. With the establishment of the W site, G remained as it was with its existing clients.

The different site functions and staffing therefore are as follows. At SL the site is mainly a small animal practice. Historically the accounts staff (two) have been based there and this continues to be the case. The site is managed by the site vet, Gareth. The G site is mostly a small animal practice and in addition all dermatology referrals, which are usually internal to the practice, are carried out at G by Andy who is the site vet for G.

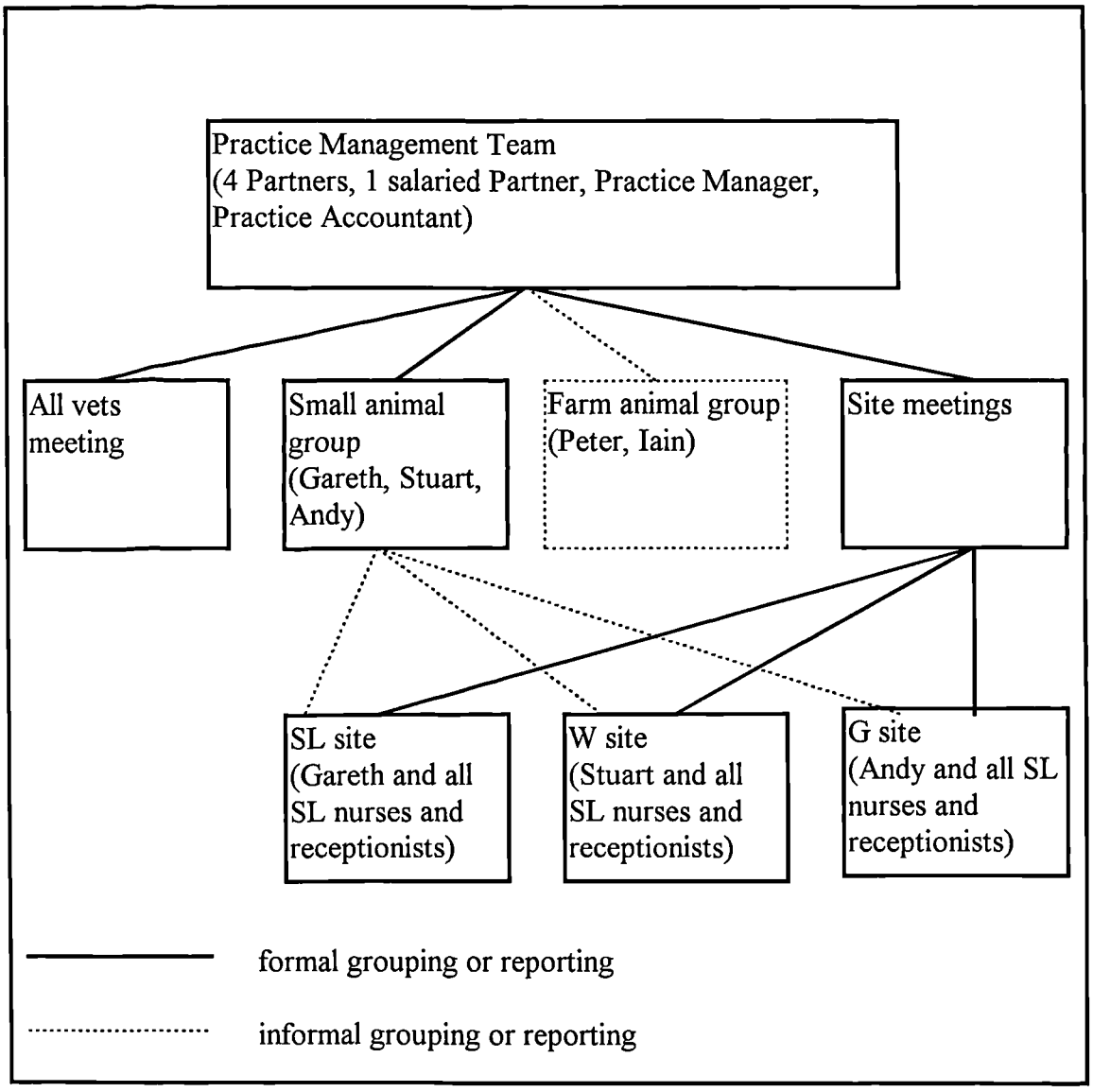


Figure 6.1 Management and reporting structure of the groups/teams within HVP

At W, the newest site, is the Farm Office which co-ordinates the work of the two main Farm vets, Peter and Iain. The Farm Office is located on the first floor of the building and is physically separate from the small animal work that is done on the ground floor. W is the site for ophthalmic referrals both internal

and external and the specialist in this field is Gareth. It is also the site for small animal orthopaedic referrals done by Stuart. The site also accommodates the Practice Manager, Sandra, who in addition to this rôle continues to work and be based in the Farm Office since this was her rôle prior to the opening of the W site. The site is managed by the site vet, Stuart.

In addition to the rôles and functions mentioned above the practice has established a management structure with Peter taking a general management rôle assisted by Sandra, the Practice Manager. Although no documented organisation chart was available the management and reporting structure can best be described diagrammatically as in Figure 6.1

Figure 6.1 shows the established structure within which it was expected that the Practice Manager could keep an order between the daily routine and the management needs.

6.2 Terms of reference for the study and initial meetings

The author was approached by HVP initially in order to help the management team better understand its information needs prior to considering any investment in an IT infrastructure. The rationale for the study was linked to the management team's agreed strategy which was presented through discussion rather than being formally documented. The management team in the last three years have seen an increase in the pressure on the SL site in terms of an increasing client base and the lack of appropriate accommodation to meet the increased demand. This led to the decision to open a new site, W, which would take some of the client numbers and also enable the practice to offer a purpose-built Farm Office and centre for farmers to visit to purchase veterinary products. The financial profile was such that funding the new premises was viable and the expectation was that the income from the new site would in the long term provide financial stability for the Practice. At the time of the study the management team realised that the growth in business since the opening of the W site had exceeded expectations and were considering ways to stabilise their client base such that a further site is not required in the future.

Prior to the move to a three site practice the Partners had recognised the need for them to move their personal management away from day to day management tasks and they had therefore pursued a culture of empowerment and teamwork in order that decisions at site level could be taken at that level and the management team would deal with practice decisions. In a very general way they espoused the principles and some of the procedures associated with TQM (Total Quality Management) although they did not fully embrace a documented quality system. This movement has largely been inspired to date by Peter who has taken a number of management courses and had discussed ideas with business consultants. Generally within veterinary training at universities management aspects with respect to running a partnership are not covered and yet many vets aspire to be Partners for the clear financial motive and for the independence it provides. For HVP this meant the Partners managing a turnover of £1 million pounds and the management of some forty-seven staff. This also contributed to the motivation for the study since the management team recognised their own shortcomings and wished to plan for the future and exploit any further developments, such as information systems, rather than to proceed in some ad hoc way.

The key points noted by the management team in terms of their current management position were as follows:

- the preparation of job specifications for all non-Partner staff, in which responsibilities are outlined;
- the introduction of an appraisal scheme;
- the use of a business consultant to advise on team building, motivation and empowerment;
- encouraging decision making at a local team level.

The evidence to support the new management style was presented as follows: the establishment of the Practice Management Team which met weekly and which recently has adopted agenda items, presented papers and action points;

the establishment of site team meetings as the forum for passing on decisions and airing views; small animal group meetings to enable consistency across the three sites for dealing with the small animal business. Additionally Peter has a more prominent management rôle than the other Partners and it is he, assisted by Sandra, who prepares the agenda for the management team meetings and who drives the move to empowerment.

In summary then the management team broadly agreed that the move to a 3 site practice has put, and will put, demands on their existing systems, procedures, management and staff. They therefore expected an outcome of the study to be an audit or evaluation of current work practices and recommendations for change which would accommodate the introduction of computerised information systems.

During the initial talks with Peter and the management team the analyst made explicit the nature of the intervention methodology and the reasons for it. It was also established and agreed that the work would also have research outcomes. The team agreed that the outcomes of the research and the outcomes that they expected from the study were not in conflict. Indeed a number had been 'bamboozled' by computer experts selling solutions in the past and were wary of that approach. In addition to the support of the management team a letter was sent to all staff to explain the dual purpose of the study. Although no comments were made from other staff at the time many later were very interested to hear about the research. The documentation associated with the terms of reference and the letter to the staff were recorded on the NUD•IST package as off-line documents. That is to say the documents could be used as reference but were not coded. Later in the study notes made by the analyst on other documents such as marketing literature, meeting agenda, newsletters and so on were also recorded as off-line documents in the NUD•IST system.

Following the initial meetings a more detailed schedule was prepared between the analyst and Sandra, the Practice Manager, which would in one week allow

all staff to be interviewed. Individual interviews were held with the Practice Manager, the Practice Accountant and each Partner including the salaried Partner. Group interviews were scheduled with nurses at each site, receptionists at each site, the nurse supervisors and the reception supervisors. The intention in the first week was to interview and transcribe and then open code the transcripts. A number of meetings were also observed and these included a management team meeting, a site meeting and a small animal group meeting. As earlier the notes made by the analyst were recorded as off-line documents.

As discussed in the research methodology (section 5.3) the research then proceeded by establishing seed categories (Miles and Huberman, 1994) for giving an initial focus for the interviews. This is the first point at which the methods used moved away from the original methods as proposed by Glaser and Strauss (1967) and this will be discussed in chapter eight. Three such categories were used and these were:

- understanding of job rôles and responsibilities;
- decision making processes;
- communication between the three sites.

After the first week interviews were followed up with individuals and with groups in order to fill out emerging categories until the major categories were saturated. This was followed in the analysis by the identification of the core category. The next section provides the account of organisational life that emerged from the data.

6.3 Account of organisational life

This account is divided into the main categories as outlined in figure 6.2. The intention is to identify and give substance to each of the main categories and to conclude this section with attention on the core category, coping with change,

given as a summary of organisational life in section 6.3.5. The summary integrates the other categories to produce the grounded theory.

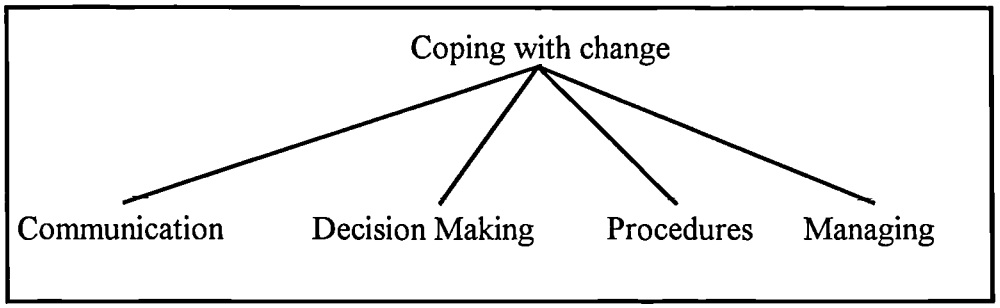


Figure 6.2 Core category and major categories

6.3.1 Communication

The move to a three site practice has highlighted the need to consider all aspects of the communication process. In particular when decisions are made at any level then decisions are being made with regard to who needs to know about the decision, how they are going to be told, and who is going to tell them. In the past the G site and the SL site operated almost as two separate practices, where the procedures and systems were almost autonomous. This was not a problem to staff at either site since the local structure and local management and number of vets meant that informally the communication process was well conducted. At SL from where the bulk of the communication emanated this informality not only enabled all staff to know what was going on but also helped to maintain the family and close knit atmosphere at the site. One example of how the informality worked was the use of the Day Book which was a record of where each vet was and whether they were doing visits, referrals, operations or consultations. In the event of a change due to emergency calls or sickness then vets coming in to the site would always check with Sandra, the Practice Manager, and look at the Day Book to find out what was happening and if changes had been made. For the G site changes were passed on by a telephone call and the site was so compact that it rarely caused problems even if it meant a nurse or receptionist being asked to cover at SL. However the establishment of the new site has

highlighted the informality of the past and the three site Practice is unable to cope satisfactorily with the demands. Using the Day Book again as an example this is now prepared at W for the beginning of the week and 'sheets' are distributed to each site on the Monday to show the schedule for the week. However if the Day Book entry changes on the Monday then telephone calls need to be made to all vets to indicate the new schedule and calls also to each of the reception teams at each site. The 'sheets' at the G and SL sites are not updated however and there is an over reliance on word of mouth. This becomes a particular problem for those assistant vets who work part time since in many instances the initial consultation will need to be followed up by a colleague but it will not always be clear who that colleague is and who should be telephoned or where a note should be left. Since client continuity is important this can create further problems in having later to deal with a frustrated client. In addition to the procedural communication between sites which includes schedules, rotas, and getting the invoices to the accounts office, which will be considered in detail in the procedures category later, there is additionally a management communication issue. This issue is related to the categories on decision making and management and will be discussed in those contexts later. In terms of this category the problem is how information can be disseminated when those involved are not in daily or weekly contact and also when the amount of information and the numbers of people involved prevent the informal dissemination of all of the information. In the past the reliance has been on key staff, notably Sandra, the receptionists and the Partners. Interestingly when the Practice was on two sites the Partners' involvement with staff on a daily basis in surgery or during and after consultations meant that 'word got round' but now the gaps appear and it is beginning to breed some frustration. The rôle of the Practice Manager is key to future success. Unfortunately this rôle although it has a job description associated with it is blurred and is seen differently by different staff and also by Sandra herself. There is a recognition that the rôle is not yet fully established and during a transition period Sandra is working both as Practice Manager and also as the main Farm Office receptionist. However detailing the work of the Farm Office

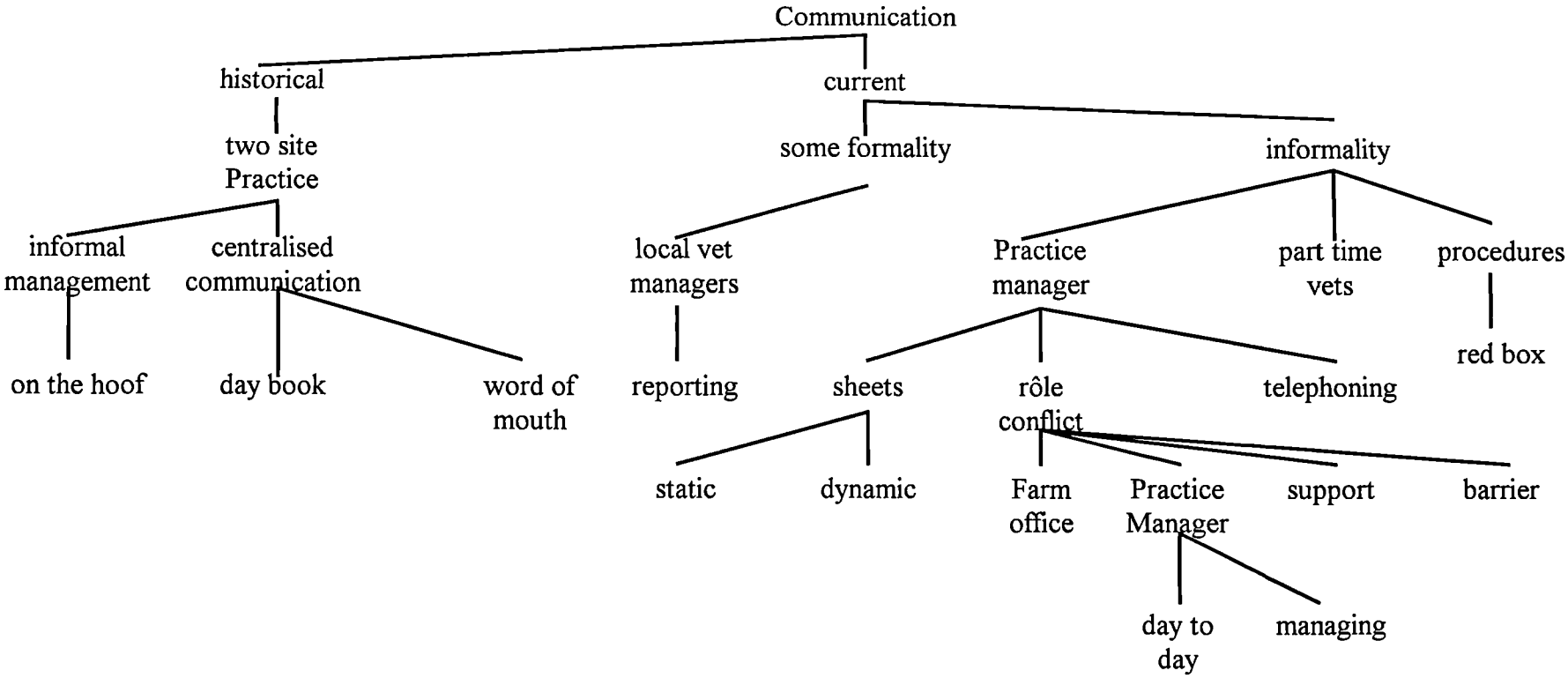


Figure 6.3 Hierarchical representation of the 'Communication' category

reception still leaves a problematic area. In terms of the job description and the rôle as Peter (who is largely responsible for developing the job descriptions) sees it, the Practice Manager should drive the Practice in terms of local management at each site and facilitate in the development of local autonomy whilst also guiding the local vet managers. Additionally it should be to give local and central managerial support. However a number of the nursing and reception staff are quite resentful of the interventions and they see her rôle more as controlling rather than supporting. For Sandra the transition to Practice Manager has been difficult because of her long association with the Farm Office and an emotional attachment to it. Sandra's perception of the rôle of Practice Manager is to 'protect' the Partners from having to deal with the 'day to day' worries or complaints of the nursing and reception staff. Indeed she very definitely perceives her rôle in a hierarchy as important and yet, somewhat ironically, this is the very hierarchy that Peter is keen to dismantle. This is also borne out by those staff who think that Sandra is something of a barrier to the vets whereas in the past if they wanted to know something or talk about problems they would talk to a Partner directly because they knew that that is where the decision making power lay. These nursing and reception staff now think that Sandra passes on a sanitised version to get decisions from the Partners. Other staff perceive her rôle as 'agony aunt'. She is there to help solve their problems. One thing is clear and it is the confusion over this key rôle where the burden of dissemination lies. In an eight hour day Sandra makes or receives some forty telephone calls internally. This will be discussed later in the recommendations.

6.3.2 Decision making

The decision making process, prior to the opening of the W site, was described as 'on the hoof'. That is to say that the process was ad hoc and the Practice was sufficiently small particularly in terms of the small number of decision makers to make that process quite effective. Indeed the necessity to make decisions on the hoof also meant having to justify them on the hoof and this in fact added to the positive feeling amongst the staff in terms of having access to

the decision makers. Since the opening of W the Partners have determined that the most appropriate structure would be to devolve the decision making to the teams that the decision affects. This is evidenced by the establishment of local vet managers at each of the sites and a site team meeting as the forum for discussion and decision making. It is also demonstrated by the formalisation of the small animal group meetings which essentially serve two purposes. The first is to bring together the vets who mainly deal with small animal work in order that they can share views, pass on good practice and make recommendations to the management team. The second, which is coincidental, is that the three small animal vets are also the local vet managers. Therefore in addition this group also considers matters emerging from the local site meetings and this can lead to standardisation in practice. However as an unintended positive side affect it needs to be noted that without this there would be no single forum for such discussion. The main forum for decision making continues to be the management team and within that the Partners and amongst the Partners those with most influence tend to be the Partner with the longest service in the practice, Iain, and the Partner with most managerial acumen, Peter. The rôle of the Practice Manager as discussed in the communication category is not sufficiently well developed to make an impact on this clear hierarchical structure.

As a matter of historical fact the Partners took all the decisions in the Practice regardless of its importance. The nurses and receptionists are now aware of the need to work in teams and make local decisions but feel that despite being told they are empowered to do so find it very difficult. They also find that those in the local teams who are managers exhibit variable quality in terms of their styles and abilities. Indeed amongst the three local vet managers only one considers he may have the necessary skills and abilities for management. The others by their own admission are looking for support, particularly from Sandra, the Practice Manager. The nurse supervisors highlight a particular problem in the decision making process. Each of the three of them are responsible for the rotas at their own site and for this includes cover for sickness and holidays. They also have to ensure that equipment and staff are

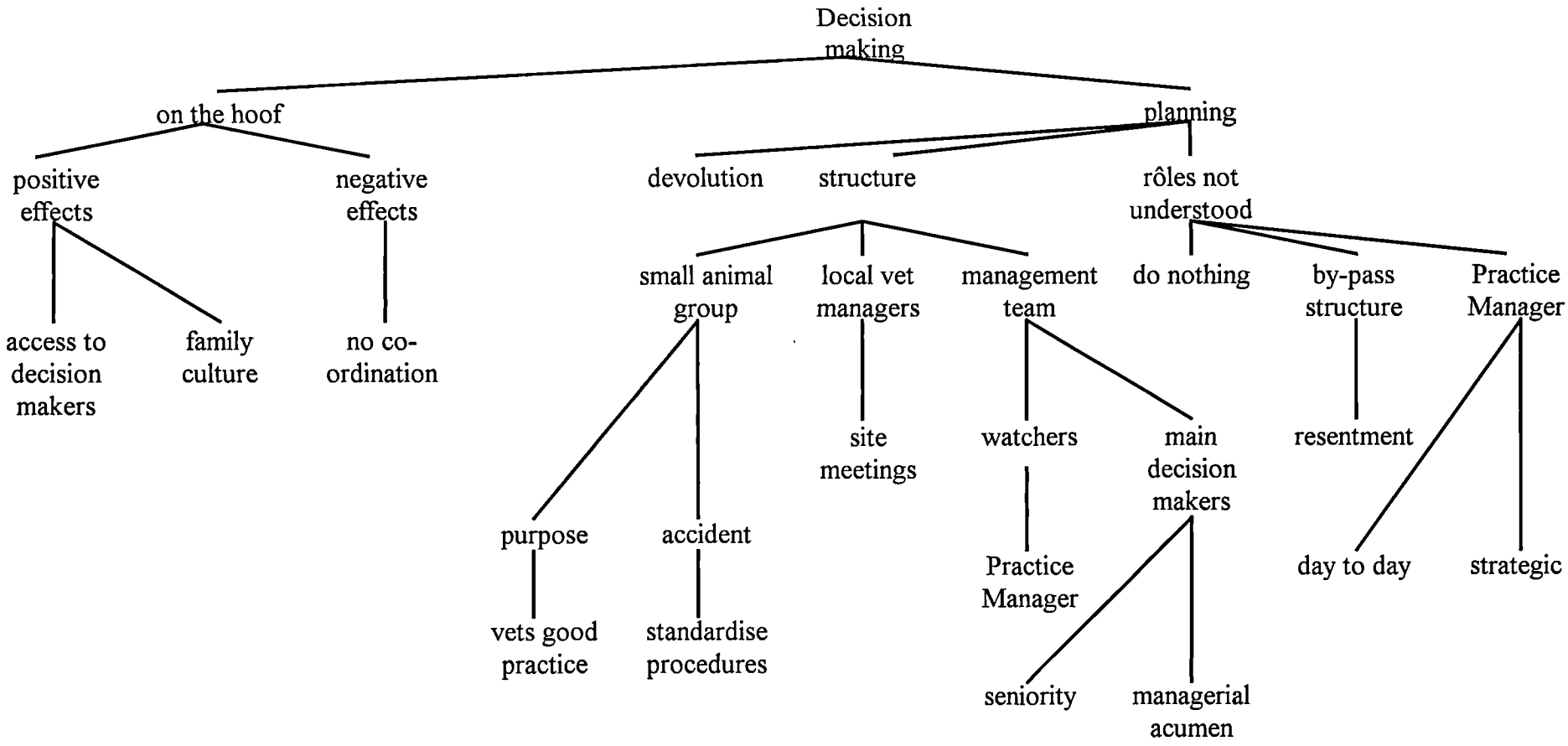


Figure 6.4 Hierarchical representation of the 'Decision making' category

sufficient to cover the needs for the surgery lists at each site. These are both site based decisions and also joint decisions. They spend a lot of time on the phone to each other and operate effectively as a team, often meeting outside of normal work time to discuss problems. However they feel that in order to make decisions they need some route to the Partners and that it is less present than it was, and the Practice Manager may be the only means by which they can present their case and this can be a barrier to enabling them to make good decisions.

The Practice Manager views her level of decision making as 'day to day', that is, it is concerned with rotas, schedules and informing people what is going on. However there is not a great deal of consistency concerning whether this is the extent of the decision making powers that she has. Peter would prefer that Sandra took a more strategic view and helped the Partners reach decisions of a strategic nature but in this transition period this is not happening.

6.3.3 Procedures

In this category the concern is the extent to which systems that are currently in place are effective and the extent to whether there is a degree of standardisation. The main procedures and systems relate to work allocation at the three sites which begins with the day book, referral procedures, the stock control procedures, the reception procedures and the accounting systems. Primarily the discussion concerns the procedures related to the small animal aspects of the practice since the respondents view of how the Farm Office procedures were conducted was relatively non-problematic.

The allocation of work to vets drives the location of other resources in the Practice. This begins with a 'nights' rota such that every vet works seven nights in every nine weeks. This is transcribed onto a wall planner which shows holidays and authorised absence. The wall planner is used independently by the vets also to arrange swaps amongst themselves. The wall planner is then the basis of the Day Book into which the vets are allocated consultancy times, surgery times, farm visit times and specialist referral times. The Day Book

shows a skeleton plan for the next six weeks. Each week the day book entries are transcribed onto 'sheets' for the reception supervisors at each site. For the staff at W they make reference to the Day Book rather than a sheet and consequently the adjustments to schedules can be made more quickly at the W site. The major problem with this procedure is that the information in the Day Book may change many times in one day and disseminating these changes to meet new demands is the responsibility of the Practice Manager. The communication problems are dealt with in the communication category.

Another procedural concern is the handling of stock items. All three surgeries have a modem link and terminal provided by the single stock supplier. There are three types of stock: Prescription only which can only be dispensed with the authority of a vet, although there is some discretion to allow receptionists to dispense the more common items; Pharmacy and merchant label stock which are kept on public stands in the reception areas but can only be sold to clients of the Practice - these form the bulk of the stock on display; General sale products. A list is maintained of all stock items at each site and the required level to be held. For the non-prescription stock each day a receptionist checks the stock on display and a daily reorder is made. This takes between ten and twenty minutes each day. For items dispensed from the pharmacy (the prescription stock) a label is prepared using the stock terminal and for these items an invoice is written with one copy going to the client and another to Accounts. The Farm Office stock differs slightly since all farmers are account holders. Therefore when they make a purchase this is added to their account and an invoice prepared. Farmers occasionally phone through orders which are written in an orders book and ordered for them by the Farm Office receptionist. A major problem with the system is not related to client misuse but rather to the lack of control over vets taking medicines from the pharmacy. For practical reasons those on home visits or farm visits keep a stock of drugs in their cars which can be dispensed by them on their call. The pink invoices will indicate what can be accounted for but there is currently no means of knowing how large the 'floating' stock is. A further problem is the use of the 'red box' into

which the white copies of the invoices go for passing on to the Accounts staff at SL and this is discussed next.

The red boxes are plastic containers which are used to transport documentation from site to site. Historically with only two sites in operation the box would be filled at the G site and brought by a vet to the SL site every day. The box would contain the copies of invoices and other accounting information such as till receipts for the accounts people to process in addition to client records that would be needed at SL for referral work. The box would be returned with client files needed for referral work at the G site. The system worked well and in the cases where client files had to be sent urgently then they would be faxed and then sent later via the red box. With three sites the red box system has been retained but the process has become more cumbersome and reflects communication problems highlighted in the communication category. The red box communication serves two purposes, transfer of accounts documentation and transfer of client records. The system is highly dependent on someone, usually a vet, remembering to take the red box to the appropriate site. Often the G red box comes to W first since Andy passes W on his way home for lunch. However the purpose of the red boxes is key to maintaining accurate financial information and key to keeping client records up to date. The impact of this cumbersome practice has been firstly, the increased use of the fax to send client details which then depends on the faxed copy catching up with the original later to keep records accurate; secondly, lost or incomplete client records, and thirdly, delays in processing client and other accounts. This informality with respect to systems is discussed more fully in the management category.

The client record system which is handled mainly by receptionists but also relies on nurses' and vets' action is another system that has been complicated by the three site move. The system begins with a client booking an appointment to see a vet for a consultation. If the client is an existing client then the receptionist tries to ensure that the animal is seen by the same vet as the last time. If it is a new client a new record treatment card is started. In either event

the booking is made in the reception book as either an initial 10 minute consultation or a 20 minute follow up or referral. The record cards are usually made available at the beginning of each consultation or operation session. The degree of readiness varies from site to site and is dependent on the working practices of the reception supervisor. Retrieval of the client records is most simple when the records can be located in the filing drawers of that site. If they can not be found then any of the following options may be possible. One or both of the other sites may have to be contacted to search for the card in their filing drawers. If the card is at another site then depending on the time between the request and the appointment the records are either sent in the red box which could take anything from same day to three days, or more commonly a copy of the record is faxed. If the record is faxed then vet notes are made on the fax and when the card arrives the fax is put with the card and it is returned to the sending site. If the records are not at another site then the records may be in the 'vet's tray'. This tray contains current unclosed cases. Alternatively the records may be with the vet who may legitimately have them for contacting the client or writing notes. Most unusually but not unknown the records may be in a vet's car. For storage and retrieval of records in the filing drawers a proprietary filing system is used which is both easy to understand and use. The pricing of consultations is done according to length of consultation and degree of difficulty. The charge to the client is made via a till-code on electronic tills which are at each site. However the G site has a different till coding system. Generally the consultations are carried out by the vets but the cheapest consultation can be carried out by a nurse. One idiosyncrasy of the system is that the vet will usually decide upon the consultation charge band to use and therefore may use his or her discretion to waive high consultation fees for example for deserving cases. Surgical cases are documented initially through the operations diary. This diary may be filled in either by a nurse (which is the normal case) or by a receptionist. The nurse input is needed to professionally judge the duration of the operation and the cage space required following the operation. In the event that the operation falls within a specialism such as orthopaedic or ophthalmic then the vet will book these into the diary or will

book it by phone as a referral at the appropriate site. Referrals will be dealt with in more detail later. For every operation the vet completes a surgery estimate form to cost the operation, the white copy of which goes to the client and the pink copy to the operations file at reception. It is at this point that the diary entry is made. On the day of the operation a surgical consent form is signed by the client. When the animal goes for surgery the pink surgery estimate and the client consent form stay with the animal. Following the operation the nurse completes an operation form which details: the actual costs, which include any overnight hospitalisation charges, using codes prepared by accounts which tally with the till codes; the client details, and the next appointment details. The operations form is usually kept for up to six weeks to allow the client to query specific details, but the record card will usually only give the total cost. Clients are expected to pay for treatment when the animal is collected.

The charging procedures for the surgical operations differ from those of consultations in that when an estimate of costs for the operation is prepared the animal owner has to make a decision about whether the cost of the operation and care exceeds the value of the animal in both monetary and emotional terms. The practice allows payment in instalments but generally this is discouraged since historically the system has been abused. For either a consultation or operation a client paying the full amount receives a white copy of the till statement and the yellow copy is kept beside the till for cashing up at the end of the day. After cashing up the yellow copy is filed in the finished account file, the treatment card is updated with the charge and re-filed. At the end of each month the head receptionist prepares an analysis from the till which gives a breakdown of sales by till codes. This is forwarded in the red box to SL for the accounts staff. When agreement has been reached to accept part-payment then the client is asked to pay at least half of the bill immediately. The client is then given a statement of outstanding amount with a stapled till receipt of the initial amount tendered. The white copy of the statement of outstanding amount goes to the client and the blue copy is kept by the till until after cashing up. The blue copy is then kept in the to-pay file. When the remainder of the amount is paid,

the client receives the white copy of a statement stapled to a till receipt. The yellow copy is matched with the blue copy of the statement of outstanding amount and both are filed in the finished accounts file after cashing up.

The receptionists must also deal with booster appointments and reminders. When an animal comes in for a vaccination then the receptionist writes out next year's reminder letter. At the end of the month all booster reminders are batched and put into a filing cabinet drawer. A marker is put on each record card to indicates when the booster is due. When the booster month arrives the receptionist checks for each record card indicated by the batch marker that the animal is still alive and double checks that the booster is due. If the record card cannot be found then the search for the record card ensues as described above. The letter can then be sent. After 3 months the record cards are checked for clients who still have not brought their animal in for a booster. In those cases an overdue booster letter is sent. This process is time consuming and is painstakingly carried out by the receptionists. However at the busiest of the site, SL, the time constraints are so tight, the chasing of records so difficult and the number of clients so large that they are falling behind with current month letters.

The final procedure that needs to be noted is the system for referrals with in the Practice. The vets with particular specialities receive internal referrals from other vets and occasionally external referrals from other practices. The latter is increasingly the case for ophthalmic work which is a particular speciality and which requires many years' training. The referral times are separate sessions from consultations and operations and are always carried out at the site where the equipment is available eg ophthalmic referrals at the W site. The internal referrals are quite informal and are usually prompted by the initiative of other vets in the Practice who make the appointment on behalf of their client. This can mean that the specialist doesn't always know what is coming up but it also means that the follow up is informal and usually the specialist will speak to the vet who has made the appointment the next time they meet. This internal referral system however is also dogged by the tracking of record cards. The

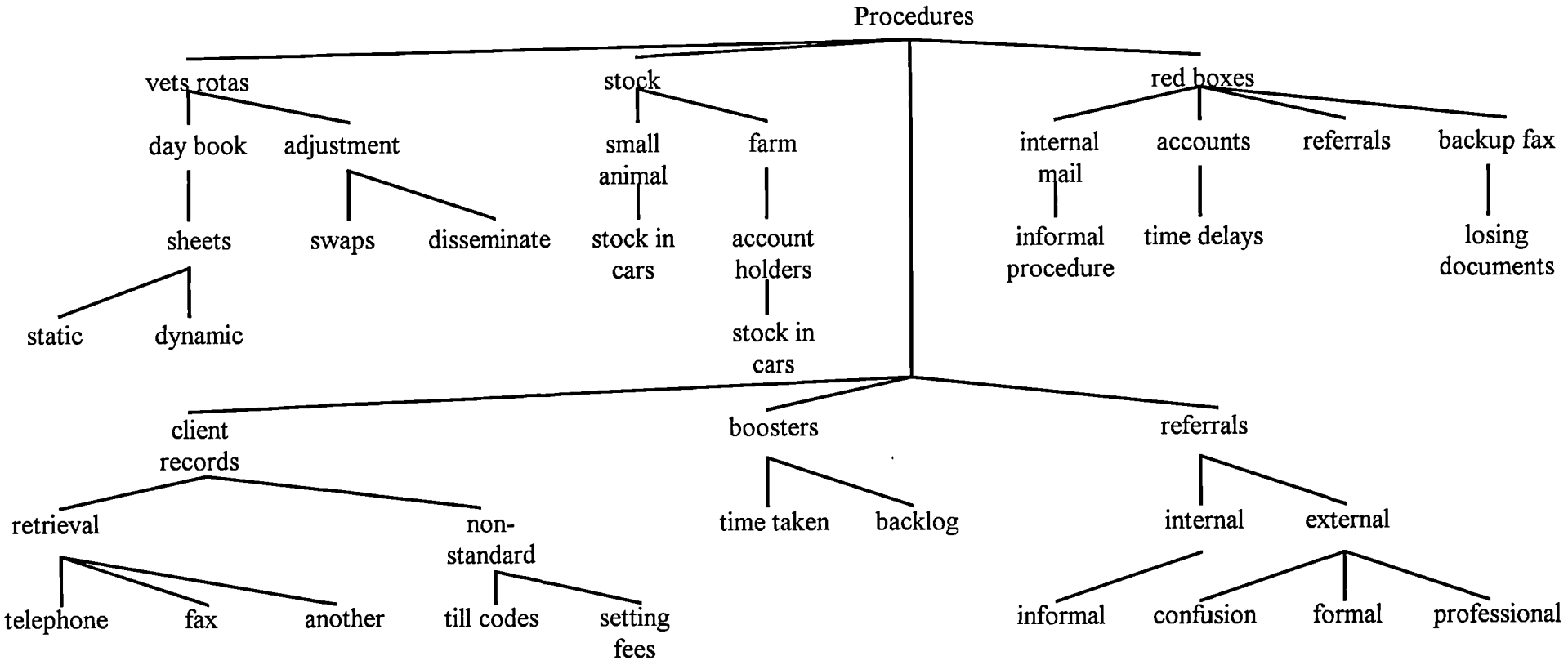


Figure 6.5 Hierarchical representation of the 'Procedures' category

external referrals are more formal and dealt with in a highly professional manner often according to guidelines set out by professional bodies. The external referrals also attract a higher fee. The referral will usually be dealt with by the reception staff but occasionally the vet him or herself will deal with the initial enquiry made by a vet from another Practice. The Partners are very keen that the image presented to external referrals represents value for the higher fee. Prior to the appointment the vet requires a letter from the sending vet giving the details of the case. This is followed up after the referral by a letter detailing the treatment, the reasons and the cost. The distinction between internal and external referrals does not affect the treatment but having two systems does cause problems to some receptionists who may inadvertently pass on incorrect advice to the clients.

6.3.4 Managing

This category will explore the organisation with respect to the management that takes place. It is concerned with the establishment of teams and how they operate, how planning takes place, formal and informal management structures, and how the standardisation of systems is managed. Additionally it will be concerned with attitudes to change and how change is managed.

As has been mentioned in other categories the management structure as newly established by the Partners is as described in figure 6.1 The objective of establishing such a structure, as articulated by the Partners, is to move towards team working such that the decisions can belong to teams and that autonomy for teams is established. There is a general acceptance of the team approach, that is to say that most staff recognise the value of team work and most recognise that they work in teams. The teams identified are the Practice as a whole, the management team, the Partners, the vets, the site teams, the nurse teams both within sites and between sites, the reception teams both within and between sites and small animal vets team. The composition of the teams is such that some are subsets of others and some intersect. There are also teams that operate that have no formal place in the management structure and these

are the accounts team, the Farm Office team, the farm vets team and the nurse supervisors team. Most interesting amongst these three is the Farm Office team because they have a physical location on the first floor of the W site, they have two receptionists, a computerised Dairy herd analysis database and two vets who specialise in Farm work. Yet they have no formal contribution to the management structure. The reason for this is that the two vets who are specialists are also Partners. One, Iain, is the longest serving Partner and considered by many staff to be the senior Partner and the other is Peter who is considered by many to be the overall manager of the Practice. Then the receptionist is Sandra who is moving out from the Farm Office to take up the full time rôle of Practice Manager. The consequence of this is that whilst all other teams have a mandate to operate as a team in a formal sense, the Farm Office team continue to act in the informal way that was a characteristic of the two site Practice. The informality of this one group alone tends to undermine the formality of the other teams. This is also evident in the way that the management team members view Peter's rôle. It is generally accepted that Peter has done most to address the management problems of the Practice but a result of this is that a number of the other Partners are quite willing to continue to take a back seat and leave the decision making up to him. They accept their own lack of management experience but feel comfortable that Peter can make up for their shortcomings. Therefore in the management team meetings Peter's views dominate. This view of Peter as a benign dictator is also felt by other staff, some of them feel that in the past it was possible just to talk to Peter directly if they had a problem, and now feel constrained by the team approach as they perceive it sometimes as a barrier to getting things done. This is also discussed in the decision making and communication categories.

One further factor which may undermine the team approach is a view understandably taken by two of the more senior Partners that, as the main financial stakeholders in the Practice, decisions that they make 'on the hoof' should be acted upon. They recognise that this may conflict with the team approach but it is both a historical and a cultural consequence of being a Partner. Interestingly the Partners with the least experience as Partners do not

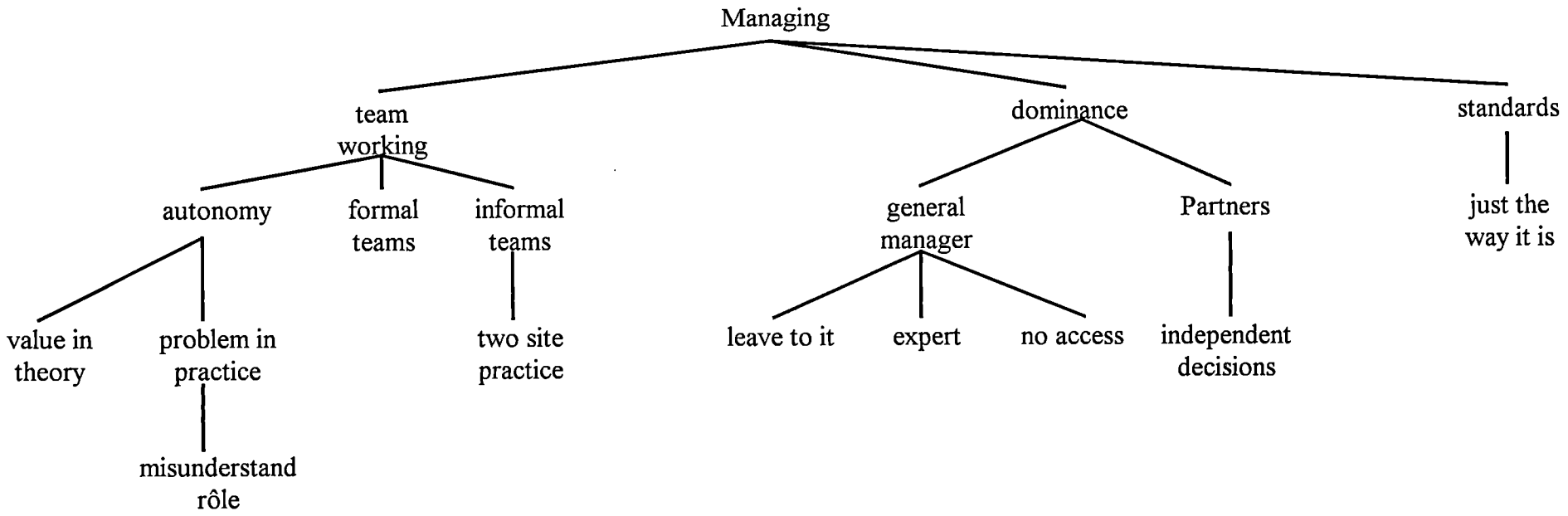


Figure 6.6 Hierarchical representation of the 'Managing' category

find the team working a problem and in fact embrace it as a means to their becoming better managers.

The mix of formal and informal procedures is not always a problem. In fact it is the informality of management that existed prior to the establishment of the W site that helped to engender such a family atmosphere and facilitated the pulling together of staff to cope with the high demands of work. However the three sites now have a degree of formality but it is unclear to all staff where that begins and ends and when it is important or unimportant. Receptionists for example cannot decide whether standardisation of consultation, surgery and filing systems is necessary. Many accept that 'that's just the way it is'. It is the lack of understanding rather than the lack of standardisation or formalisation that is a problem. Similarly all non-Partners have job descriptions and an appraisal system is in place. However Partners are not subject to job descriptions or appraisals and this leaves them in a difficult position with respect to their responsibilities and being able to evaluate the extent to which they have been successful.

As this is a time of transition, the W site has only been open for six months, then all staff are willing to see what will happen and are willing to embrace new ways of working and new management structures. This is a positive feature of the Practice.

6.3.5 Summary of the organisational life

This summary will draw upon the major aspects of the hierarchical diagrams and the commentary which represents the major categories (Figures 6.3 to 6.6). This summary is concerned with the core category 'Coping with change'

HVP has successfully grown in size in order to accommodate a new site. All former procedures, structures, processes and rôles needed to be evaluated when this took place. In many cases they were, and in some, not at all. Therefore currently the Practice is a mixture of old and new managed through an as yet incomplete management structure. At the simplest level the Partners,

and to a less extent the management team, viewed change simply in terms of the logistics of a third site. The preparation for change was in terms of relocation of staff and clients and the functions of the new site that would be taken away from SL to relieve the pressures. There was some attention to change in terms of management structure which was led by and championed by Peter. Many of these ideas were accepted but not always owned by those who were to be affected and this included lay staff in addition to veterinary staff. The key to the change process should have been the establishment of the rôle of Practice Manager but in many ways this appointment failed to deliver its expected results. For the Partners the appointment of the Practice Manager was a reward for how she had handled the logistics of the move to the W site. For the person concerned the adoption of the rôle was reluctant and her view remains very much that it is the Partners, not she, who make strategic decisions. What has emerged then during a period of transition has been a Practice Manager who retains her old rôle as Farm Office receptionist. She is respected because of her long involvement with HVP and has been cast as the person who will manage the communication, implement and standardise the procedures and play a key rôle in decision making. It is this key aspect of the change where the old and the new have been allowed to continue together that is highlighted in the supporting categories. It may be characterised by the retention of old ways for the comfort that the old ways provided rather than the risky wholesale adoption of new ways of working. Elsewhere within the Practice this is seen by considering informal (old) and formal (new) practices and procedures; decision making 'on the hoof' (old) and management planning (new); communicating by 'word of mouth' (old) and having clear lines of communication (new). It is how HVP is coping with change in particular and the supporting evidence of communication, decision making, procedures and managing, that provides the grounding for making the practical recommendations that follow later.

6.4 HVP action case theoretical analysis

This section begins to answer the first three research questions which ask whether the conjunction of ethnomethodology, grounded theory can help to elicit requirements. In terms of the research methodology this may be considered to be the research outcomes of the action case study. The practical outcomes are dealt with separately in section 6.5.

In terms of ethnomethodology as the paradigm of inquiry the expectation on behalf of the researcher was that ethnomethodology would provide the epistemological basis of the intervention. That is to say that attention to the interviewees' own words would be paramount. Whilst this was the case in the sense that interviews were taped and transcribed verbatim - other contours of the perspective also impacted on the study. Perhaps the most important of these was the relationship between the analyst and the actors in the domain. It is neither possible nor desirable to dismiss the effects of what Goffman (1959) calls the 'dramaturgical perspective' of the study. That is to say that outside of the interviews the interactions between the analyst and others in the study impacted upon the analysis of the transcripts. The other affect of this 'drama' being acted out is the interactions between actors which took place away from the analyst. Goffman refers to this as the actors helping to 'sustain the plot'. For Goffman, and other early ethnomethodologists, the interesting aspect of this was to perform deliberate disruptive action in order to comment on the effects. Clearly the disruptive aspect did not enter into the study. This raises an interesting question about the use of a research perspective in a practical study since for practical activities the researcher is interested in practical outcomes and some of the richness of the research perspective - in this instance disruptive action - is avoided. One may then question whether the process of requirements elicitation is flawed since as in traditional requirements engineering methods those involved may be giving the answers they think the analyst requires in order to sustain the dramaturgical loyalty. This question is revisited in chapter eight.

The expectation at the beginning of the study was that the use of a Grounded Theory approach would enable requirements to be elicited. That is to say that using the procedures a hierarchical tree of categories could be produced which at the most abstract level would indicate situated requirements. The summary of organisational life in section 6.3.5 is the *product* which is useful to the sponsors of the study. Of interest to the research is the *process* and whether it is useful. Also of importance is how requirements can be said to have been elicited from the hierarchy. As noted earlier in this thesis the two important theoretical aspects of Grounded Theory as proposed by Glaser and Strauss (1967) are what they term 'theoretical sampling' and 'constant comparison'. It is these together that enable grounded theory to be induced. In many respects the most difficult aspect of this is the degree to which the analyst is led by the data which is the inductive process, or the extent to which the analyst leads the category building based on his or her own interpretations. Simply saying the approach is inductive does not *make* the approach inductive. Throughout the analysis there is always a tension for the analyst to maintain the process as inductive. For Glaser and Strauss (1967) this tension is overcome by saying that theoretical sampling is the means by which a category can be said to be complete because the analyst repeatedly returns to the domain to ensure that the category is 'saturated'. In practical terms the number of times an analyst can return to the domain is restricted simply by the practical constraints. For Grounded Theory research studies the expectation is that the process may take place over an average of four to six months, yet again in practice this appears not to be feasible. Although authors such as Pidgeon et. al (1991) comment on the time consuming task of coding the greater problem lies in the time taken to develop theoretical categories. The former can be speeded up with software packages but the latter requires a good deal of time to be spent. It seems to the author that this is the limiting time factor. In terms then of using Grounded Theory in practical rather than research-based situations the analyst has to make an adaptation in order to make the process useful. It may be argued then that since theoretical sampling and comparing is at the core of Grounded Theory then any attempt to lessen its impact means that it no longer can be

claimed to be Grounded Theory but rather some derivative. In the HVP case although time was not a major factor certainly the idea of a six month study was out of the question. Therefore the author made certain practical adaptations which necessarily included the use of core categories as stated but also included analyst-led rather than exclusively data-led decisions. Here one is relying on the analyst's personal skill set rather than on the method which although a seeming departure is not entirely dismissed by Grounded Theorists who talk about experience in the method or the dangers of the methods being used by naive users.

The move from theoretical abstraction of categories to requirements is perhaps an example of the most significant departure from the Grounded Theory method. For Grounded Theorists the hierarchical categories are intended to give a rich description of the domain. Writing up this account is an end point - it enables others to have a better understanding of the domain. In this practical study the account whilst useful to the sponsors was not sufficient. The expectation at the beginning of the study was that the highest level of categories would express the requirements in the most general sense and that at the lower levels of category specific requirements such as 'the red box problem' would be identified. In practice the sponsors required a list of required actions - a procedure which fall outside of the Grounded Theory method. The means by which this was achieved was to précis or summarise the rich descriptions from the categories. It is recognised that this is an interpretive act and a criticism may be that having used methods to induce categories then none were formally used to meet the practical demands of the organisation. This again forces consideration of the consultant/researcher dilemma and the tensions that this creates. These are revisited in chapter eight.

After this action case the research questions remain unanswered. The critical aspect of the research is that the practical exigencies of a consultancy domain have outweighed research considerations. This has led to adaptation of methods and the expectations expressed in the earlier chapters of the usefulness of the conjunction have not been completely fulfilled.

In the following section the practical outcomes of the research are expressed. To some extent this falls outside of the proposed methodology but nevertheless it helps to elucidate one aspect of the consultant/researcher dilemma as noted above.

6.5 Recommendations to the organisation

The recommendations are made with respect to the original terms of reference for the study. To summarise from section 6.1.1, this was in order to help the management team better understand its information needs prior to considering an IT infrastructure. Therefore the recommendations are concerned with highlighting those areas that need attention in order that the introduction of IT may be considered

issue	recommended actions
rôle of practice manager	discontinue the twin rôles of practice manager and farm office reception attend to standardisation across sites including: 'red box'; till codes; stock in cars; referral system provide terms of reference and reporting structure for teams/meetings
ownership of management structure	make each site autonomous staff belong to single site specify management rôles
formal communication	address day book and work rotas establish communication for referrals
client records	introduce computerised record keeping for client records and booster reminders

Figure 6.7 Issues and recommended actions from the HVP action case

They also indicate which areas may be considered for the introduction of IT but it is not within the scope of this study to propose an 'IT solution'.The IT infrastructure specifics must be dealt with at a later stage once the grounded

requirements have been understood. The recommendations are summarised in figure 6.7 and detailed below.

It is imperative that the rôle of the Practice Manager be fully established in terms of responsibilities, decision making and planning. In particular the current split rôle between Practice Manager and Farm Office must be discontinued. With the Practice Manager fully embracing the rôle then she should be able to address some of the anomalies that exist due to the move to the three sites. These should include standardisation of procedures with respect to accounting (red box, till codes), stock control (stock in vet's cars), internal and external referrals and general receptionist duties. The Practice Manager in conjunction with the management teams and other teams should formally prepare terms of reference for each team and for the forums (meetings) which are the means by which these teams make decisions and report. In particular attention should be given to those teams which retain their informality such as the farm vets' team and the nurse supervisors' team.

Following on from the above, the management structure needs not only to be understood but to be owned. The Practice is too large to work as 'one happy family'. The establishment of each site as autonomous within the overall control of the practice is essential. For this to work the local vet managers must be clearer about their rôle as managers and they must be supported in this by the Practice Manager. The movement of staff between sites to cover for staff illness or absence can still be accommodated but each member of staff, vet or lay, should be based at a site with a line manager.

Formal lines of communication should replace the informality of the past. The dissemination of 'sheets' made up from the day book is inappropriate. One consideration following the more formal site based work is to consider a virtual Day Book to be at each site, owned by that site but managed centrally by the Practice Manager. One other communication problem that needs to be addressed is highlighted by the part time vets who need to pass on work and notes to another vet. Currently there is no formal system for this. This also

bears upon the means by which referrals internal and external are dealt with. To overcome these latter two problems and also the major problems associated with the client records system, such as booster reminders, lost cards and so on, it is recommended that the records system in total be reviewed. In this instance it would seem reasonable that this would be the first area to be addressed by the introduction of a computer system. From the professional veterinary magazines available it is clear that software packages exist for maintaining veterinary records and this ought to be the start point for the next stage. Computerised record keeping must be introduced incrementally, probably starting with the site with the most problems, SL. The management team must also consider the impact upon the staff who will use the system, but it is encouraging that none are actively against change which facilitates their work. It must also be achieved following the establishment of the sounder management structure.

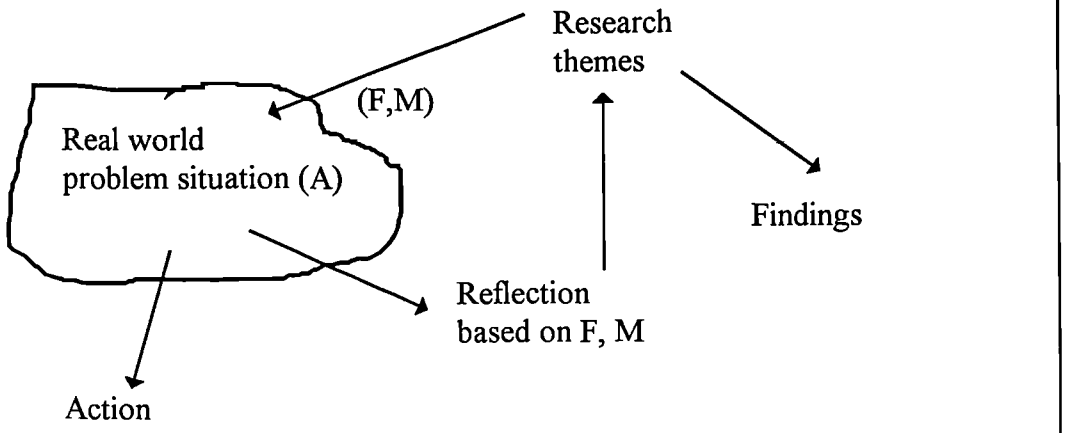
6.6 Learning from the action case study

In this section the focus shifts from the action case study analysis, and the practical findings relevant to the organisation, to the reflection by the researcher.

This is expressed in terms of the learning that took place about the framework of ideas and the methodology of intervention following Checkland's (1991) cycle of action research model adapted for this study (Figure 4.4). As Sandberg (1982) notes it is reflection that is the means by which the researcher can maintain a distance from the study in order to analyse it in respect of the framework, the methodology and the developing concepts.

It will also be necessary in this section to consider the research themes and to judge whether the questions have been answered partially or in full or indeed whether they have been shown to be appropriate. The research questions are not formally reviewed until chapter eight.

This section concludes with a revised framework of ideas and a revised intervention methodology for the next iteration of the action research cycle. To begin, the reader is reminded of the action research cycle as it applies to this study in Figure 6.8 (based on Figure 4.4).



Research themes:	i) using methods in information systems analysis more commonly associated with the social sciences ii) implications for rôle of analyst iii) a postmodern paradigm for requirements determination iv) Information Systems as a distinctive discipline
F:	using methods from the social sciences in information systems for eliciting requirements
M:	the three way conjunction of ethnomethodology, Grounded Theory and action case
A:	HVP

Figure 6.8 Applying Checkland's (1991) cycle of action research to the HVP action case

6.6.1 The framework of ideas

The basis for the framework is that the requirements elicitation phase of information systems analysis is ostensibly a finding out process and that in that process the systems analyst acts as a social researcher. Therefore it should be possible to use social science research methods.

The major stumbling block highlighted by the HVP action case is the 'reference discipline' problem, a phrase used by Keen (1980) to call for researchers to respect the standards of the discipline from which concepts or methods are drawn. Adam and Fitzgerald (1996) argue that IS researchers have trivialised or misused results from other fields. They ask two questions about IS research which borrows from another discipline which has a particular resonance for this action case study. Firstly they question whether adequate attention has been given to understanding the other discipline, in this case sociology. If not they maintain that this 'knowledge gap' limits the validity of any research findings and the wider this knowledge gap then the less valid are the findings. Secondly they identify a 'methodological gap' in which researchers attempt to use methods without appropriate practical knowledge of the conditions and context in which they were carried out in the original discipline.

In the course of this action case both of these gaps were apparent. Firstly the researcher in this case is by education and practice within the information systems discipline. The appeal of ethnomethodology and Grounded Theory for the researcher is the attention to the finding out process and the extent to which this overlap with that part of information systems concerned also with finding out. In this action case the researcher has been able to exploit his knowledge of sociology. What becomes important is the extent to which this framework of ideas is useful to practising analysts whose knowledge of the reference discipline is less well developed. The action case may be considered to be a call for a change in rôle for systems analysts to have a more broader based understanding of sociological methods in order that these can be exploited in the organisational domain. The knowledge gap also highlights how important it is that work be done at the boundaries of IS research if the discipline is to mature. Little (1991) notes that importing established research paradigms into newer fields of research is commonly associated with gaining respectability for the emerging discipline. What is important is the consistency in terms of philosophy with which the established methods are imported and an acceptance that they may in time become unrecognisable from how they are used in the reference discipline. Strauss and Corbin (1994) regret that Grounded Theory

runs the risk of becoming fashionable outside of the sociology field, but this hegemony is dangerous since no method or methodology can stand still, it will change as contexts and experiences change (Jayaratna, 1994). Therefore the learning about the framework for this action case may be considered as moving from borrowing from another discipline to contributing towards the maturity of the IS discipline. Taking Adam and Fitzgerald's (1996) second point about the methodological gap it is true that the researcher has no direct practical use of the use of Grounded Theory in sociological research, such as for example Glaser and Strauss' original work in the use of the method to understand chronic illness and dying. Indeed it may be said that applying Grounded Theory in systems analysis is very different from applying Grounded Theory in research. Pidgeon et al. (1991) use Grounded Theory as a 'basis' for knowledge elicitation and point to 'practical considerations' as reasons which prevent the use of Grounded Theory as described by Glaser and Strauss. Therefore rather than make claims for Grounded Theory it may be more appropriate for this action case to consider that the findings for the case can be considered as a result of grounding information systems. The action case does not make any claim to extend the use of Grounded Theory in the sociological sense. To make clear that distinction the author shall continue from this point to use the term 'Grounding Information Systems' and the acronym GIST derived from it to refer to a method based on Grounded Theory in an ethnomethodological perspective. Therefore in the following sub-section what are considered are the practical methods associated with GIST and whether these were useful in the HVP case.

6.6.2 Methodology

The methodology for the intervention was designed according to the guidelines given in Chapter five, namely that ethnomethodology would be the perspective for data collection and that the principles of Grounded Theory would be the method of analysis. Combined, these are proposed as the GIST methodology. Prior to outlining how these methods changed in the context of the study it is

worth bearing in mind cautious advice about methods in qualitative analysis in general

"The most serious and central difficulty in the use of qualitative data is that methods of analysis are not well formulated. For quantitative data, there are clear conventions the researcher can use. But the analyst faced with a bank of qualitative data has very few guidelines for protection against self delusion, let alone the presentation of unreliable or invalid conclusions to scientific or policy-making audiences. How can we be sure that an "earthy", "undeniable", "serendipitous" finding is not, in fact, ***wrong?*** *"* (Miles, p.591, 1979, Miles' emphasis)

It is to be expected therefore that what has been proposed in Chapter five may be changed by the experience of using the methods in practice.

At HVP the data collection was according to the ethnomethodological perspective and as discussed in Chapter 5 each of the interviews was based on the seed categories. The major concern as the action case proceeded was the time taken to transcribe and subsequently code and compare the transcripts. On average a forty minute interview takes up to three hours to transcribe. The initial coding should begin as soon as the transcription is complete. At HVP the interview schedule was such that three interviews were completed before the initial coding began. On reflection this was a mistake since the coding of the first interview is critical to the rest of the data collection and analysis. It also became apparent that identifying key staff first should form a part of the design. AT HVP it was by good fortune rather than good judgement that the first interview was with the Practice Manager. The coding of the first transcript was a long process taking about a further 3 hours. However the process brought some fruitful lessons to the fore. Firstly the task was immensely eased by the use of the NUD•IST package. In particular it was possible to generate as many as thirty codes which were stored as the first categories. Many of these codes were in vivo codes, that is, they were the words used by the interviewee. Most interestingly one of these, 'on the hoof', later became a major category in the analysis. However it also the case that

many of the codes were later discarded. Glaser and Strauss (1967) consider the emergence of 'theory' as an inductive process and that therefore in the initial coding nothing should be omitted. In practical terms however this attention to the coding provides rich but often irrelevant pictures of the organisation. On reflection the seed categories and the terms of reference for the study need to be used by the researcher to focus the emergence of theory. It is perhaps this aspect of the analysis more than any other that distinguishes GIST as a practical method of systems analysis from Grounded Theory as a research method. The criticism of this may be that the GIST methodology then moves from an interpretive and inductive process to one which is both positivistic and deductive. The author however would contend that this is too harsh a judgement since the seed categories do not in any sense determine the outcomes of the analysis and that the analyst's perspective is one of ethnomethodology where the emphasis is on what the actors (interviewees) say rather than what the analyst determines to find. It is the means of data collection that ostensibly provides the epistemological basis of the methodology and not the procedures associated with the analysis.

After a couple of days of interviewing and transcribing, it was clear to the analyst that it would not be possible in the time to complete full coding and comparing, the analysis would proceed by coding the latter transcripts less rigorously that the first ones. The analysis time was then devoted to axial coding whereby the analyst compared categories and sub-categories and developed memos on these and on the documents. This decision was based on pragmatism alone. In terms of learning from this it is clear that the management team from HVP were more interested in an early written report and recommendations than they were in the methodology being followed prescriptively. This adaptation of methodology in practice receives attention in the IS literature. Wastell (1996) suggests that there is sufficient evidence to show that

"methods can be successfully assimilated and used by practitioners in a critical and flexible way; evidence suggests that this adaptive reaction is common, especially in experienced designers" (Wastell, p.37, 1996).

Fitzgerald (1996a) critically appraises the use of formalised systems development methodologies and notes that,

"In practice, situations will inevitably arise where the developer [analyst] needs to step outside the methodology, but formalized methodologies often serve to impose a considerable inertia on the development process' (Fitzgerald, p.19, 1996a).

For the HVP study therefore the adaptation that is proposed is not failure to adhere to the formal methodology but rather learning leading to adaptation. The detail of the adaptation is outlined later in this section.

One of the claims made by Glaser and Strauss (1967) about Grounded theory was that the method was so rigorous that any experienced analyst would reach the same core and sub categories. Would it be reasonable to expect for example that a Grounded Theorist other than the author would highlight communication as one of the major categories and within that the role of the Practice Manager? The author would contend that this would not happen and not simply because the author is inexperienced in the use of the procedures. However the insistence on scientific rigour and has led to Grounded Theory being cast as a positivistic method and indeed some authors (Corbin and Strauss, 1990) go further and suggest that it is possible to reinterpret the scientific canons of 'good research' to indicate how Grounded Theory can be considered as 'good scientific method'. For this action case it was clear that ethnomethodology provided the paradigm for inquiry and Grounded Theory the basis for the methods of analysis. Therefore it would not be reasonable to expect, in this largely interpretive perspective, that where the analyst him- or herself has such a rôle in the intervention, repeatability is neither possible nor desirable. However given the time taken to transcribe and code it would seem on reflection desirable for a group of analysts to work together to transcribe,

code and analyse. Indeed this may be the single greatest contribution to making the methodology useful.

Following the transcribing and coding of the initial interviews and attention being paid to axial coding it was necessary to return to interviewees in order to saturate the categories that were emerging as important. This focussing meant that the interviews were more structured since the information being asked for was quite specific. For example one of the procedures that kept arising as being problematic was the use of red boxes to transfer records between sites. Therefore the brief interviews that took place perhaps lasted only ten to fifteen minutes. However from the original transcripts it was clear that procedural areas were being raised which required a longer interview time such as the reception duties or the stock control system. Grounded Theory suggests that these are 'explored' but for the findings it was necessary that they were also formally documented and then agreed with the participants in the study. Thus in order to facilitate this the analyst moved from the explicit ethnomethodology perspective for data collection and in its lieu asked the interviewees to specifically consider the detail of these formal systems. A criticism may be levelled that in moving from the ethnomethodology perspective and indeed the inductive nature of Grounded Theory that the methodology failed or that the analyst failed to use the methodology. In defence of the action taken it is perhaps appropriate to consider how it may be possible to view these systems as being 'embedded' in the ethnomethodological approach rather than being outside of it. Miles (1988) considers the situation from the perspective of 'hard' systems being embedded in a 'soft' systems approach. His argument is that it is possible to combine the 'hard' and 'soft' approaches to information systems development and retain methodological consistency by treating 'hard' as a special case of 'soft'.

"This arrangement serves as a possible exemplar whereby tools and techniques from ***other*** *systems-based specialist fields might be effectively deployed in conjunction with a 'soft' systems problem solving approach"*
(Miles, p.59, 1988 (Miles' emphasis))

That is to say that systems that have a well defined or procedural or indeed systematic nature may be analysed using 'hard' methods. The importance of the 'soft' approach is that it is the 'soft' philosophy within which these methods are applied. Indeed Miles goes on to say that the 'soft' methods are necessary for the managerial intervention if the 'hard' methods of analysis produce complex or difficult situations which relate to human activity. Reinterpreting and applying this to the GIST methodology it is possible to see the interest in systems such as record keeping and the method of finding out being 'harder' than that associated with ethnomethodology merely being an expression of this embedding. Viewed in this way it does not present methodological problems. Indeed it adds to the methodology the openness of contingency. It may be further possible to suggest that the perspective of ethnomethodology in the action case need not have precluded the use of methods such as data flow diagrams, more commonly associated with 'hard' methodologies, for example as being more appropriate to describe the procedures associated with the receptionist duties. Although clearly these would have been used as well as rather than instead of the Grounded Theory approach since data flow diagrams would not have been able to establish the situated nature of the procedures.

Within the perspective of ethnomethodology the validity of findings can only be assessed by the participants (actors) in the study. During the HVP study the validity of emerging categories and eventually the validity of the account of organisational life was achieved in two main ways. Firstly, and most importantly, through the saturation process the interviewees were given access to the preliminary memos about the categories. There was no case where an interviewee disagreed with what had been coded and then memoed. It was in fact encouraging to note that the most likely reaction was an initial surprise to have their views reflected back to them in a way that they had not previously considered. One such example was the informal / formal establishment of teams. The memo described the informality of the Farm vet teams and linked this to another category which was the former ways of working in a two site practice. The vets concerned agreed that this was the case but they that they

'...had never thought of it like that before'. This validation is a very strong aspect of the methodology. The confirmation of findings when they are reflected back to the participants encourages further analysis but also engages the participants in the analysis process - that is to say they perform analysis through their responses as the work progresses. When the final account was prepared it was circulated to all participants for comments. Again no negative comments were received and indeed the report made a major talking point not least because it had been issued on behalf of all participants by the researcher and not by the management team. It was the management team, however, that showed the most enthusiasm and it was pleasing that they considered that the final account (report) to be a reflection of the organisational life. The fact that there were 'no surprises' pleased them. What was most encouraging was the confidence they received from it in order to implement changes.

6.6.3 The revised framework and methodology

In this section the major learning points from the above discussion are summarised in figure 6.9 and described in the text following in order to provide the basis for the next action case.

	Learning
Framework of ideas	To consider the ideas as the *basis* of (not absolutely *dictated* by) Grounded Theory and ethnomethodology. Use the acronym GIST (Grounding Information SysTems) to make clear this distinction
Methodology	To use seed categories as initial categories
	That *focussing* from seed categories to specific procedures/properties be encouraged
	Concentrate on memoing as a strong validation feature by users

Figure 6.9 A summary of learning from the HVP action case study

For the framework the major change is the deliberate move away from considering the methodology to be dominated by Grounded Theory as

presented in the sociology literature and instead to consider the procedures associated with Grounded Theory to be the *basis* for the analysis of the transcripts. However it is important to retain ethnomethodology as the perspective since this establishes the epistemological status of the methodology by its concern for interviewees own words. In order to make the distinction the methodology is to be referred to as **G**rounding **I**nformation Sys**T**ems (GIST). Not only does this provide a neat shorthand but it also conveys the idea of a methodology whose aim is to get the gist of organisational life.

For the methodology three important learning points have been identified. Firstly the importance of *seed categories* which need to be made explicit from initial terms of reference, but with the understanding that this is a guide to the practical process rather than the determination of findings. The second important point is the use of *focussing* which begins with the seed categories but which then proceeds through axial coding and is completed with saturation or selective coding. A further point of focussing is that the general categories provide the basis for understanding specific procedures. That is to say the 'hard' systems are embedded in the 'soft' inquiry method. The third and final important point of learning is the importance of memos in the *validation* of results. The memos provide the means to communicate both an emerging and a finished account as well as interim accounts relating to specific interviews or categories.

Other associated learning relates to the method itself and to practical considerations. The interview schedule should be designed to allow for key staff to be interviewed first. The schedule should be planned to allow time for parallel interviewing and coding so that masses of uncoded transcripts are not accumulated. The use of a software package such as NUD•IST is invaluable in making the methodology more efficient for storing, retrieving and indexing data. One note of caution here is that the software package must be used to support rather than dictate the analysis. Finally the methodology may be more practical for large organisations if groups of analysts, rather than a single analyst, were involved in data collection and analysis.

In the next chapter the results of the learning for this revised framework and revised methodology are put into a second practical situation.

CHAPTER SEVEN

THE ACTION CASES - FP UK

In this chapter a second action case is presented in which the GIST methodology was the methodology for intervention for an information systems audit. Following the action case consideration will be given to the impact on the methodology and framework from the lessons learnt.

7.1 An overview and historical perspective

The FP Group consists of three private limited companies which are financially independent. FP A/S was registered in Denmark in 1952 to produce iron dust cores, ferrites and ceramic capacitors. FP UK was founded in 1986 in North East Wales to provide a second manufacturing and marketing base for FP products. Whilst a fraction of the size of its Danish counterpart, FP UK maintains the attention to quality products and services for which the Danish company is renowned. In 1990 a new Danish company FP Components was established to deal with the component department of FP A/S which allowed the latter to concentrate on its materials and research activities. Over the years the FP Group has forged strong links with technical institutions and other companies in the UK and the EC and is currently involved in several joint research and development projects with academic and commercial concerns within the EC. FP UK specifically has a design alliance with a German manufacturer and outlets for sales in both Italy and Germany.

FP UK offers a manufacturing capability for the production of most types of high quality inductors and transformers. Transformers are produced as custom designs and also in standard ranges. A highly flexible production facility ensures short lead times on custom designs as well as standard products. A small amount of business is with factored products (selling Danish manufactured products) . Currently 17% of turnover is spent on research and development and 50% of turnover is generated by special products. The estimated growth is 20% per year. Although the majority of orders is for coils

the biggest growth area in 1995/6 for FP UK was in connectors. The connectors business is the area which is tied to an alliance with a German organisation for connector design.

The culture in FP UK owes much to the philosophy of the Danish owner SH. He is a very caring person and very thoughtful with regard to the well being of the workforce. When FP UK began, this caring may have been excessive and the Managing Director reflects back to a time when the atmosphere was 'more like a holiday camp than a factory'. Over time however the balance between control and caring has been established and currently it remains a happy place to work as well as being a productive place to work. Many of the non-production staff work unpaid overtime and voluntarily occasionally miss holidays. All staff are on first name terms and change is always discussed rather than enforced.

The customer profile shows that of 200 customers the top 20 make up about 60% of the business. Of the 60 or so suppliers the top 20 supply 80% of components. FP UK employs 18 full time salaried staff who work in administrative or management roles and an additional 20 who are production line workers. One of the staff, the Sales Manager, is based in the South of England to give FP UK a physical presence in a part of the country which represents a high concentration of customers. Currently the production workers are on temporary contracts.

The business objectives are loosely arrived at by the management team and can be summarised as:

- to increase profit, with long term profit being more important than short term;
- to continue growth of turnover at about 20% per year;
- to aim for stable employment for all staff;
- to continue with manufacturing and factored products.

Currently FP UK faces two major decisions with respect to the future of the organisation. The first is to determine whether the future for FP UK lies either in manufacturing or in sales. One possibility is to establish a separate organisation perhaps called FP Sales UK. The second and related decision is to determine an investment strategy in IT/IS linked to business objectives.

7.2 Terms of reference for the study and initial meetings

The stimulation for this study was an invitation to small and medium enterprises (SME's) in the North East Wales region to attend a seminar which aimed to attract participation in a Welsh Development Agency (WDA) pilot scheme entitled 'Harnessing the Information Technology of SME's in Wales'. The incentive for the SME's was that the WDA would subsidise the cost of an initial audit and consultation. For FP UK the seminar was timely since they wished to become autonomous in their Information Strategy Planning.

The methods for the study had in the past been constrained by a business process model but by agreement with the consultancy company and with FP UK it was deemed appropriate to use the GIST method. However the time constraints for the main stages of the study were non-negotiable and these were to complete a two day audit, to report findings and validate the audit within an additional seven to ten days and to agree upon recommendations for an IT infrastructure within a further ten days. The main concern from FP UK was to enable them to address the key decision regarding the effective use of IT.

During the initial talks with Colin, the Managing Director, prior to the audit, the author made explicit the nature of the intervention methodology and the reasons for it. It was also established that the work would also have research outcomes. Colin agreed that there was no conflict between the outcomes for FP UK and the outcomes of the research. Indeed given the nature of the methodology to be used he was pleased to move away from consultancies that 'were in the business of selling us solutions rather than helping us'. (This comment is very similar to those made by the clients in the HVP action case, chapter six). Colin circulated a letter to all staff outlining the purpose of the

study and spoke to a number of staff to see if what was being proposed was reasonable. A schedule of initial meetings was then arranged and time allowed for follow up interviews. With such a small organisation and due to the time constraints individual interviews only were used and these only with administrative and management staff. Documentation that did not pertain to the interviews was recorded as off-line documents using the NUD•IST package. As discussed in chapter 6, the use of seed categories remained important to the methodology and for each of the initial interviews these were:

- understanding job rôles and responsibilities;
- the impact of IT on work.

7.3 Account of organisational life

The following account is divided into the main categories identified through the analysis. These are integration, control and culture. The summary at the end of the main account is concerned with the core category demarcation / definition in which it is made clear how the main categories integrate to produce the grounded theory.

7.3.1 Integration

As FP UK has developed in the last ten years it has concentrated on developing those IT systems which support the internal information flow. The development of IT systems to support external information flow is less well advanced. The major internal IT systems are defined by two Workgroups networks which have functionally split the organisation into 'engineering' and 'administration'. The historical reasons for splitting the network relates to poor performance in the past but the legacy is that the users on the different networks cannot electronically share data and information. Whilst the prevailing feeling is that this lack of integration does not adversely affect efficiency there is evidence that data from one network that is needed on the

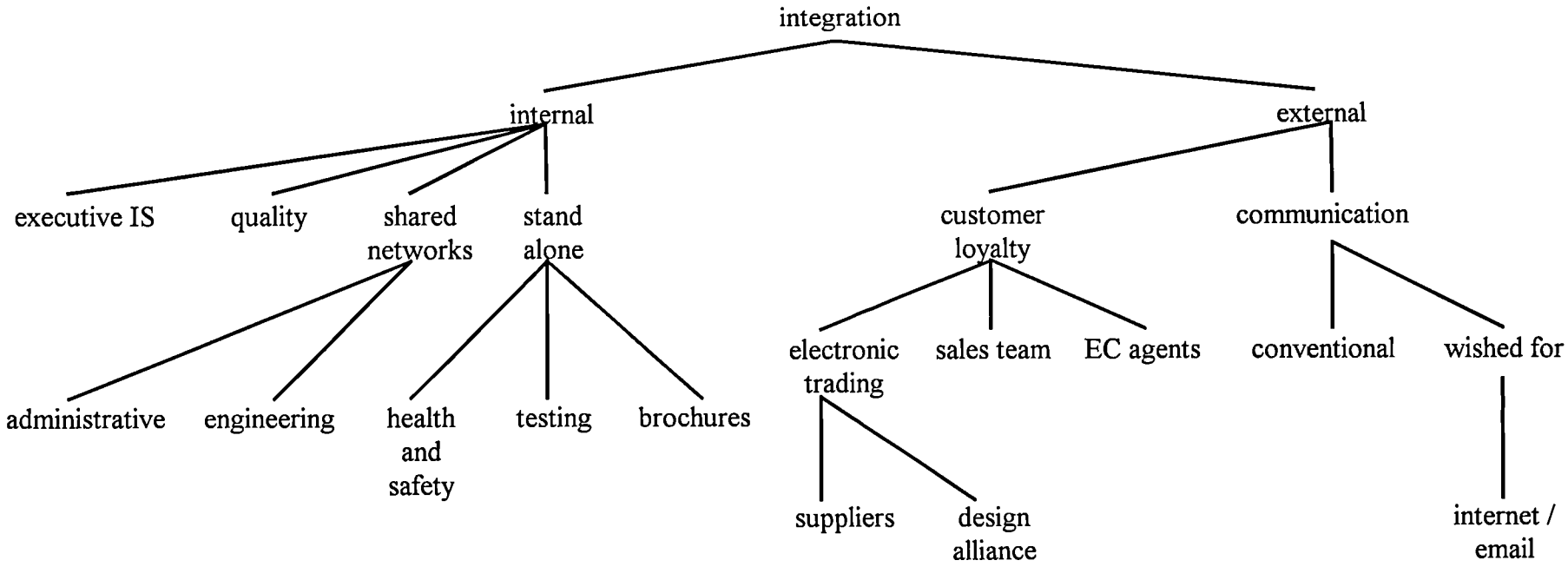


Figure 7.1 Hierarchical representation of the 'Integration' category

other is transferred by floppy disk or by hard copy. Another aspect of the IT organisation is the extent to which applications which run separately from either of the networks are indeed stand alone. The application set where this comes into question is the Health and Safety procedures and forms, the production rig testing data and the production of brochures for trade fairs and exhibitions. For each of these applications the stand alone nature of the application is determined by the person who uses the application and not the context of the application in the overall information management. Two further non-IT aspects are also worth consideration with respect to integration. The first of these is the recent achievement of the quality standard ISO 9000. It is the nature of the quality standard that it is intended to be integrated through the organisation and yet the procedures and forms associated with it remain partially paper based and partially on the Technical Manager's PC. The second aspect of interest is the extent to which the Managing Director considers himself to be a user of both networks. His work is sufficiently diverse for him to remain concerned with the engineering designs and specifications as well as summary financial, and management accounting, information. To that extent he views himself as having an executive overview of the information systems in addition to using some applications, such as the brochure production, which are specifically related to his position as Managing Director.

As mentioned the IT support for external information is less well advanced. Indeed most of the external communication is through conventional means which is predominantly telephone and fax. Access to market advice is a little more technologically advanced with the use of the CD-ROM. However those who use these methods are acutely aware of the changes in technology and are made further aware by the inclusion of e-mail addresses and web addresses on correspondence and in marketing literature. There is a mood of acceptance that the move to external e-mail and to the internet is inevitable and, although it has not been formally articulated through business meetings, many can see a business case for these technologies. An important aspect of the external integration is customer loyalty. FP UK have a reputation for quality of production. The major sales outlets however consist of agents in Germany and

Italy and one person, the Sales Manger, in the South of England working from home but 'on the road' calling on existing and likely customers. The sum of the IT supporting this is one PC for the Sales Manager who telephones orders and who receives cost information by telephone or fax. As customers themselves, FP UK have been approached in the past by major suppliers to become involved in electronic trading with the supplier providing the PC, modem and software. This has not developed. It has however raised questions about electronic trading and the extent to which FP UK ought to be involved either as customer or supplier. In particular the need to have some systems 'open to view' has more recently come to light because of the design alliance with the German manufacturer. In order for this alliance to be productive the German manufacturer will need to have some access to stock information from FP UK and vice versa. Although strictly not electronic trading it nevertheless is a move to thinking along those lines.

7.3.2 Control

By his own admission the Managing Director has his roots in engineering and not in management. However increasingly his rôle is more managerial and he sees a time when this will almost be exclusively the case. In preparation for this in the last few years he has had to 'push down work' on to those managers who have responsibility for particular areas. The response from the other managers has been very encouraging and for many the responsibility coupled with the good working atmosphere has led them to develop their own areas and their own staff in ways that significantly contribute to FP UK's overall performance. With respect to IT this is most evident in the amount of training made available to those who use applications and IT systems. For some it has been a steep learning curve but also enjoyable. One impact of the autonomy of the smaller teams has been the somewhat ad hoc approach to IT and information systems.

The ad hoc development is perhaps most evident when considering the engineering database. The requirement for the database is clear since it contains the detailed specification and designs of all components and where the

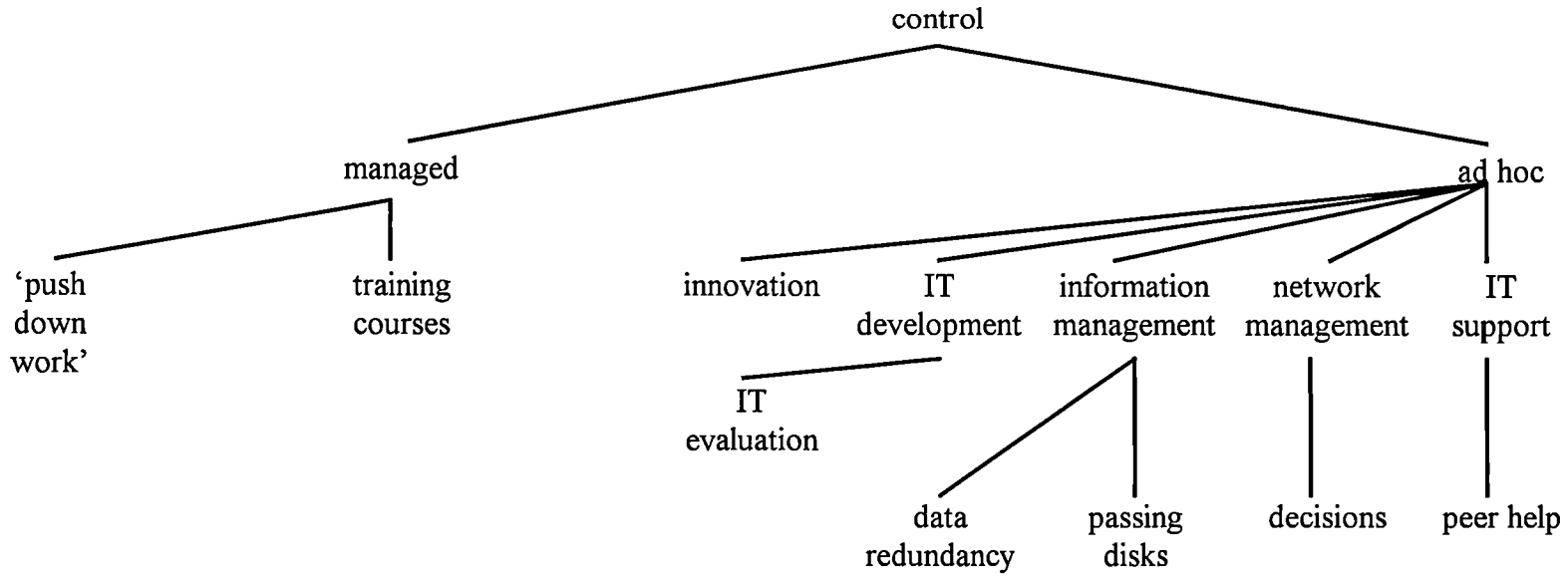


Figure 7.2 Hierarchical representation of 'Control' category

components can be sourced. As such it used both for production sheets and also for costing customers' tailored designs. However the design of the data base has been based on the amount of knowledge about a particular data base package (Microsoft ACCESS) available to the designer at the time. As the designer attended further courses the data base has been re-designed but there is still little evidence to suggest that the design has been evaluated with respect to optimisation or efficiency or indeed that the correct package was selected in the first place.

A further aspect of the ad hoc control is the approach to information management. Since the two networks have been split then ways of working have developed to overcome anomalies. Examples of this include the Technical Manager passing costings on paper taken from the engineering database to the Sales Clerk who enters the information onto a Word document for the customer. This information then may form part of the SAGE accounts. A second example is the Company Secretary taking information from SAGE which is saved onto floppy and then imported onto a spreadsheet for the Manufacturing Resources Manager. The final example and one already mentioned in the 'Integration' category is the transfer of data to floppy disk from the administration network for the Managing Director to view on his own PC. It is clear that currently the size of the organisation both in terms of people and workload is sufficiently small to deal with these anomalies. However there is some concern expressed about what will happen when the organisation grows as planned.

An aspect of the ad hoc approach which relates to controlling the development of IT can be seen in the decision which led to the splitting of the network into two. At the time the decision was made to improve performance, but the consequence was to artificially divide areas of work which were inter-related. Because of this decision on hardware, subsequent software development was constrained by the architecture. One positive aspect of the ad hoc approach, and a feature which will be covered in the 'Culture' category later, is the degree to which employees give each other support in order to overcome IT

problems or to develop IT solutions to overcome problems. The negative effect of this is that it has led to data redundancy and problems of data synchronisation such as in the case of the Manufacturing Resources Manger receiving a snapshot of the main engineering data base on disk to track expected production times. A further positive side affect of the ad hoc control is the use made of the internet by the Production Technician. He has access to the internet at home and has downloaded shareware software which he has been able to adapt for use with the programming of test rig equipment. Such innovation can flourish in an environment where the management of the use of IT is not tightly controlled.

7.3.3 Culture

Within FP UK there is a heavy IT usage and the level of IT maturity is generally high. A number of the staff - the Managing Director, the production technician and the Engineering Assistant - are sufficiently capable of developing their own applications, and the first two maintain and back up the networks. The administrative staff are knowledgeable about the office systems they have to use and the Company Secretary has a good knowledge of SAGE and is able to tailor reports for her own needs. The IT maturity of all staff is encouraged through training courses specific to their work. The consequence is that those staff who formerly had little or no experience of IT prior to joining the organisation soon become competent users. One negative effect of this competence is the tendency for some staff to have ownership of particular software packages 'I have always used it, I don't think anything else would be as good' which can be limiting when considering wider issues than those which apply to single domains. Those staff who have the least IT experience are more willing to try new IT solutions.

A very positive aspect of the organisation which enables it to overcome many of the IT problems which may arise is that the staff are happy with their working conditions and work well together as a team. This provides a good

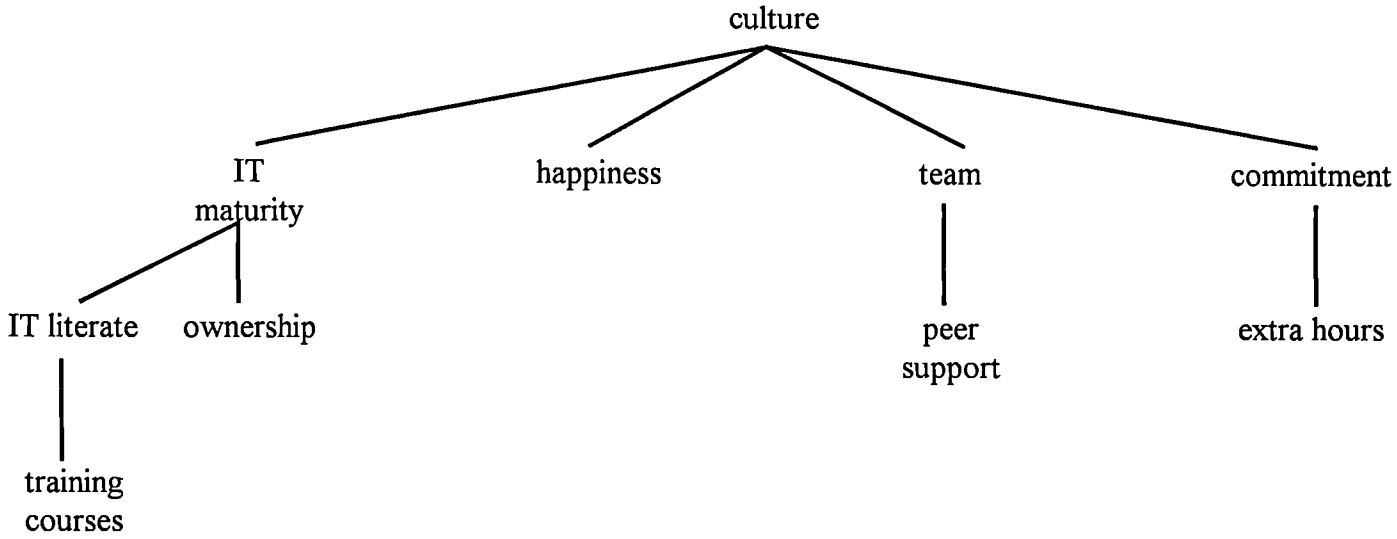


Figure 7.3 Hierarchical representation of 'Culture' category

basis for peer support for those staff who may have queries or problems related to IT. This self supporting community is nowhere more obvious than in their commitment to work in terms of the unpaid extra hours and indeed often in terms of holidays not taken in order to meet schedules.

7.3.4 Summary of the organisational life

In this section consideration will be given to the core category, Demarcation / definition which emerged from the analysis. Although demarcation may seem a strange word to use it is meant to indicate that in FP UK the staff have a mixed understanding of why they have the IT and what they are doing with the IT they have. The development of the organisation in the ten years since it was established is marked by the use of IT to complement and increase the efficiency of the work that is done. Since the majority of the work is engineering then the focus of the IT development has been in supporting engineering. The second focus has been towards administrative support and therefore this too has been computerised. What is missing is a focus on external activities, and, in particular, sales. The management strategy has been to purchase software and develop systems but not within the framework of a plan to effectively manage the IT. The evidence for this ad hoc approach has been detailed above and it is a testament to those who work for FP UK that commitment, peer support and an investment in IT training has helped to keep the IT infrastructure effective. It is recognised by most staff that they have the basis to move forwards with newer technologies but there is a general reluctance to see this in terms of an IT plan or strategy. The view taken by most staff is to see new technologies in terms of single applications or pieces of software that can overcome single problems. This would include for example the need to use external e-mail to contact partners in collaborative research, or the use of some form of electronic trading to ensure that the German manufacturer has access to some of FP UK's stock data. The positive aspect is the responses made by the Managing Director who has in the past been a champion for change and who has not been shy of purchasing hardware and software as required. This management commitment and staff IT maturity

should together ensure that the IT can be effectively harnessed. What may be lacking above all is a holistic view of IT.

7.4 FP UK action case theoretical analysis

In this section the research questions are raised again. Now that the original conjunction has changed the question most prominent is the extent to which the revised conjunction of ethnomethodology and Grounded Theory is useful in eliciting requirements.

An analysis of the HVP case indicated that an important aspect of ethnomethodology was not being explicitly attended to, namely the disruptive action. It was also clear that a further aspect - the dramaturgical perspective, which suggests that research is more than the transcripts, influenced the development of the categories. In this action case an additional practical pressure, time, conspired to ensure that the ethnomethodology perspective was even less of a guide. Particularly since full transcription of interviews did not take place. It may be argued therefore that the theoretical perspective which guided intervention was broadly one of agency rather than specifically of ethnomethodology. The agency perspective as defined by Giddens (1976) 'stresses the practical activities of human beings in intentionally constructing their social world'. This describes the researcher's perspective and thus the degree to which ethnomethodology enabled the elicitation of requirements receded. Most critically it may be argued that this move from the ethnomethodology perspective may reduce requirements to simply observations and an openness on the behalf of the analyst. However from the action case it is clear that an attention to the words spoken by the actors remains important- it is now only questionable as to whether that is ethnomethodology. This is revisited in chapter eight.

With respect to the use of Grounded Theory procedures this study was again limited by time and hence as with the HVP action case practical considerations governed use of the method. In particular the sponsors were keen to have direction as to what to do next and were much less concerned with the

herarchical account. To that extent the rationale for the recommendations which follow is that the sponsors expectations were for actions that they should take or decisions that they should reach. The research outcome remains the account of organisational life validated by those who participated. The main issue for the researcher is the role conflict which arises when faced with that dilemma since there is no way within the theory (ethnomethodology and Grounded Theory) of justifying the recommendations.

Specifically to address the research question. The FP UK case enabled the researcher to learn about the process of using methods from social science research in a practical analysis study. However it is clear that the degree of adaptation suggests that the original conjunction of methods is not very useful. Furthermore for paid consultancies issues arise which are alien to social science research in which the research concerns can be uppermost. A fuller treatment of these issues is given in chapter eight.

The following section completes the practical outcomes for the sponsor

7.5 Recommendations to the organisation

The recommendations are made with respect to the original terms of reference for the audit devised from discussions with the Managing Director and his staff. To summarise from section 7.2 this was to enable them to address the key decision regarding the effective use of IT. Therefore these recommendations are concerned with identifying a possible strategy and indicating the technologies that will help FP UK itself develop that strategy. A summary table is given in figure 7.4 and detailed in the text below.

It should firstly be established that the introduction of any new technology or changes to existing technology should provide the flexibility to allow FP UK to respond to changes in product lines. This is of particular concern when considering the implications of the existing and possible future design alliances. With that in mind it is clear that the existing IT infrastructure is unsatisfactory.

issue	recommended actions
IT/network infrastructure	move to single network system in the short term use software (eg ODBC or MRP) to facilitate data transfer
external links and internal integration	evaluate engineering database explore e-mail; internet; intranet possibilities consider IT link with German alliance partner (longer term EDI)
managing change	change should be incremental and understood
long term planning	appoint single IT support/manager (possible internal appointment) develop own IS/IT strategy planning as part of business planning

Figure 7.4 Issues and recommended actions from the FP UK action case

As FP UK grows then the engineering and administrative functions need to be considered as an integrated system. In the short term this may be through a single network solution and the transference of data may be overcome by implementing an open data base connect (ODBC) facility. In the longer term however consideration may be given to a move to a Manufacturing and Resource Planning (MRP) solution.

The ad hoc development of systems and the consequent fragmentation of data must come to an end. In particular the engineering data base needs to be evaluated in terms of both internal consistency and efficiency and also the suitability of the chosen generic data base package. This work may also lead to the MRP solution outlined above. A point of concern from the audit is the lack of an external focus for IT development. This can be considered in three areas. Firstly to explore the use of the internet and e-mail as replacing or complementing existing conventional communication means with all stakeholders. Secondly to develop the link with the German manufacturer as an electronic IT link. This will be related to the evaluation of the engineering

data base and the consideration of MRP and it leads to the third area which is research into the whole field of electronic trading and electronic data interchange (EDI).

Given the history of development in FP UK to date it would be reasonable if change were incremental rather than dramatic and that the policy of all staff involvement continue through the change period. In order to achieve maximum benefit from the audit it will be necessary to introduce formal IT planning into the business cycle to ensure that change is managed and is holistic. This final point may point to the appointment in the longer term of either an IT-support or IT-manager person. The decision on the level of support required will depend upon the extent to which existing staff wish to develop their own IT expertise in new areas.

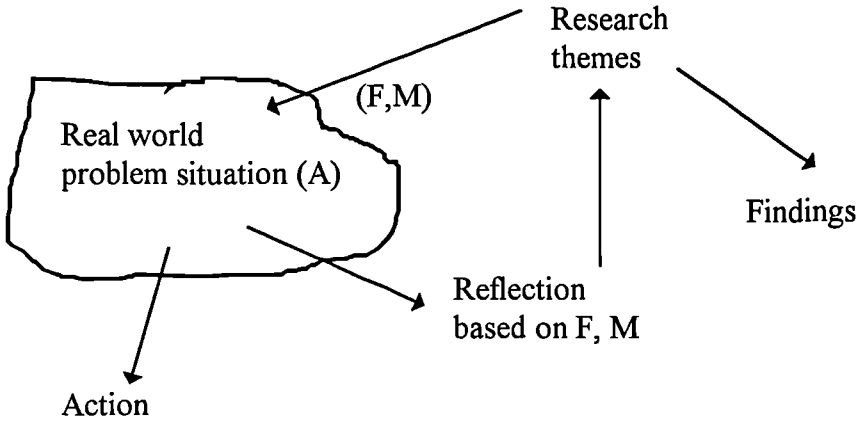
7.6 Learning from the action case study

In this section the revised framework and methodology presented after the HVP action case will be considered. This action case concludes the empirical work and therefore the learning from this action case is presented in this chapter. The learning is further explicated in chapter eight when all of the empirical findings from the two action cases will be evaluated.

Figure 7.5 is the action research model that is the outcome from the HVP action case and hence the model used for evaluating the research themes, methodology and framework for the FP UK case.

7.6.1 The framework of ideas

The major problem with the framework of ideas for the FP UK case study is still the reference discipline problem as highlighted in the HVP case. Although GIST can be considered to be a methodology of the information systems discipline, it is the degree to which the adaptation has left the methodology devoid of methodological status and perhaps devoid of rigour that becomes an important question.



Research themes:	i) using methods in information systems analysis more commonly associated with the social sciences ii) implications for rôle of analyst iii) a postmodern paradigm for requirements determination iv) Information Systems as a distinctive discipline
F:	using methods from the social sciences in information systems for eliciting requirements
M:	Grounding Information SysTems (GIST)
A:	FP UK

Figure 7.5 Applying Checkland's (1991) cycle of action research to the FP UK action case

One element certainly has been attended to and that is the usefulness of the method but the question that remains is whether the methodology is a methodology of intuition and individual creativity only loosely guided by its original methodological principles. In particular when one moves away from the tenets of a methodology or indeed a discipline then the question is about relevance and rigour. These particular issues were debated in the IFIP TC8/WG8.2 Working Conference on Information Systems Research (Nissen et al. 1991) and the comments have a resonance with this research and the development of this framework of ideas. Turner (1991a) asks how it is possible to appreciate relevance in the research process. He suggests that relevance can only be established following the interaction between the researcher, the

research results and real world organisations whereas rigour can be established without giving consideration to the research context. Furthermore he stresses the importance of researchers striving for integrity as a practical approach to relevance. Another cause for concern raised in the same debate is the naiveté with which information systems researchers borrow from the reference discipline (Walsham, 1991a). He expresses anxiety that the use of methods from another discipline, say sociology, by information systems researchers should be scrutinised by experts in the reference discipline or else there is a danger that the quality of the research suffers.

For the action cases presented it is only possible to say that practical outcomes have been successful but that the issues of relevance and scrutiny by sociologists have not been demonstrated.

7.6.2 Methodology

In this second action case the basic procedures of the Grounded Theory approach were augmented by the three main learning points from the HVP action case. These were the early establishment of seed categories, the focusing of the study as analysis progressed and the validation of interim and final results by the interviewees. For the FP UK case each of these three proved very useful particularly since the timescales involved in the FP UK case were very tight.

The first difference was that following the establishment of the terms of reference and the seed categories that would form the basis of the interviews, the schedule of the interviews was planned so that there was sufficient time between interviews for transcribing and initial coding. Also, the schedule was such that the order in which people were interviewed was carefully planned with the key people being interviewed first. This was not really problematic since the criteria used for selecting key interviewees was simple - current exposure to computing or information technology. However an interesting learning point emerged which draws attention to the value of the method. One of the last people to be interviewed was the Production Technician since his

rôle according to the organisation chart was maintenance of the production machines and production test rigs. In addition to this he kept the test records. However when interviewed it emerged that as someone who had been with the organisation since it opened in the UK he had been instrumental in the maintenance and development of all of the hardware infrastructure. Furthermore, at home he used the internet to download shareware programs for test rigs to make the testing more efficient. The transcription and coding of his interview therefore elicited many new categories and all previous transcripts had to be thoroughly re-coded and compared. Although time consuming in terms of analysis, the results in terms of the IT maturity and IT use within the organisation were very important. The method of course is inductive and therefore 'discoveries' in the sense in which Glaser and Strauss used the word in their original work (Glaser and Strauss, 1967) are not only catered for but are indeed fundamental to the method. This does not invalidate the use of the seed categories but it does point out the dangers of treating the analysis as a deductive rather than inductive method. A criticism of this may justifiably be that it was not the method, that is Grounded Theory, which found this but rather interviews and follow ups and that that this could have been discovered other than by using Grounded Theory.

One further learning point that emerged from this single interview transcript was that when the interim results (through memos) were shared it was clear that others who worked closely with the Production Technician had little understanding of the degree to which his expertise contributed to the use of IT in the organisation.

The second departure from the methodology as proposed after the HVP case was the extent to which all interviews were fully transcribed and coded. Despite the fact that there were fewer interviewees in this case the timescales imposed by the constraints of the consultancy was such that not all interviews could be fully transcribed and coded. However the use of the NUD•IST package did permit those interviews that remained in taped form only, to be included in the analysis as described next. Using the NUD•IST package it was

possible to listen to the taped interviews, transcribe the relevant passage, (which would range from a couple of sentences to two or three paragraphs) and augment existing categories or create new ones directly and therefore avoid the full transcription step. Because this seemed such a departure from the method, the taped interviews that were not fully transcribed were usually those where categories were being saturated. That is to say they were second or third interviews with the same person. However, on reflection, and considering the results of the analysis, it would seem that this departure from the method did not adversely affect the practical outcomes. The reasons for this are almost certainly to do with the use of the software package which in the original Glaser and Strauss method was of course absent. In the original paper based method great emphasis was placed on transcription since the transcribed document was the physical medium for coding also. That is to say margin notes in the form of codes were critical to the success of the method. However the introduction of the software package as the medium reduces the importance of the transcript except as evidence. (It is accepted that the tape itself is evidence but it is much less accessible than paper). Hence the sequence tape-transcribe-code becomes tape-partial transcribe-code. The difficulty with this is that when the analyst needs to compare new documents with existing documents then only the codes or categories or partial transcript are available and therefore the taped interviews have to be listened to again. A further difficulty with this practical adaptation is the auditability of the method since although categories can be traced to the source document, the document itself is not a full account of the interview. A further consideration on this point is that the paradigm of inquiry for the method, ethnomethodology, is concerned with transcripts being in the interviewees' own words. Whilst the adaptation is true to this in terms of the partial transcript, it clearly does not contain all of the interviewees' own words and therefore may not be in keeping with the ethnomethodological perspective. However as with the HVP action case this dilemma between practical outcome within time constraints and theoretical rigour, whilst of interest to the analyst, must be resolved in favour of the

practical outcomes. The question is whether what remains is viable as methodology, and this is discussed further in the next chapter.

As with the HVP action case, this case was most rewarding in terms of the validation both interim and final that was done by the interviewees. In addition to the example given above regarding the Production Technician other interesting outcomes were seen. For example, the Managing Director had never thought about the extent to which IT had permeated the organisation and the extent to which they were already heavily dependent on it. The Company Secretary was of course aware that floppy disks had become the means of data transfer but had never considered this as a potential problem should the organisation continue to grow at the present rate. Perhaps most interestingly when she considered the problem she produced from a desk drawer a software package which if it had been installed could have overcome at least part of the problem. The value of the validation cannot be over-stressed and it is covered in detail in the evaluation of the GIST methodology in the following chapter.

7.6.3 The revised framework and methodology

This sub-section summarises the major learning points from the FP UK action case in table form in figure 7.6 and descriptively below.

For the framework of ideas the main learning point is the extent to which the GIST methodology has departed from the original conjunction of Grounded Theory in an ethnomethodological perspective. This departure maintains the *basis* of the Grounded Theory procedures, as noted following the HVP action case, and the *essence* of the ethnomethodological perspective. It should perhaps not be surprising that, moving from methods more associated with social science research to methods associated with practical systems analysis, this departure has taken place. One cannot, for example, escape the practical constraints of time and resources. What is important for the framework of ideas is that GIST has not become a methodology dependent upon the arbitrary selection of social science methods. The action research process has imposed a rigour on the methodology and has forced reflection, questioning and the

articulation of these two. This is considered in further detail in chapter 8 when GIST is evaluated using a meta-framework.

	Learning
Framework of ideas	GIST departs from the original conjunction of Grounded Theory and ethnomethodology. Most importantly it retains the *essence* of the ethnomethodological perspective.
Methodology	seed categories are useful especially when the analysis is constrained by time.
	time constraint also highlighted the usefulness of a software package for sorting and indexing data.
	memos not only help in validation but also enable users to become owners of the problems

Figure 7.6 A summary of learning from the FP UK action case study

For the methodology the use of seed categories has been shown to be useful to the methods as they were in the HVP case. They were particularly useful in the FP UK case primarily because of the time constraint. They also enabled earlier focusing on categories and hence led more quickly to the saturation of categories. Perhaps the single most important learning point was the extent to which the NUD•IST software package enabled analysis to progress within an acceptable time frame. The opportunity to have documented categories and memos which could easily be re-sorted and compared provided time for the analyst to concentrate on analysis and the building of theory rather than on the time consuming task of re-sorting paper based records. Finally it is worth reiterating the value of the interim memos as a process of confirmation and validation of accounts. Not only does it bring the interviewees into the process but it enables them to consider the whole account as it emerges. It would be presumptuous to say the methodology was explicitly participative but

it did raise the participants from being respondents to being *owners* of the final organisational account.

As this concludes the action cases it is worth re-iterating the point made in chapter five that two action cases can only be considered as a tentative rather than comprehensive piece of work and the most that can be said is that the practical outcomes for each of the individual organisations were deemed satisfactory by the sponsors.

The next chapter draws the study to a close by considering the conclusions that can be drawn from the action cases and the preceding literature in order to make recommendations based on the research questions set in chapter one.

CHAPTER EIGHT

SUMMARY AND EVALUATION

In this chapter attention will be paid to summarising the study to recapitulate the major themes. The NIMSAD framework (Jayaratna, 1994) will then be used to evaluate GIST as a methodology. The chapter will then concentrate on the conclusions that can be expressed from the learning that has taken place. The learning will be evaluated with respect to the research themes and research questions that have driven the research. In particular these will be: importing methods from the social sciences into the Information Systems discipline; information systems methodology and its place in the systems development process; the rôle of the systems analyst; the value of action research as a research methodology in Information Systems. Following this will be recommendations which are based on the theoretical framework and substantiated through the empirical work. These recommendations will serve to give both practical guidance and a theoretical basis for future research and indeed future practice in situated requirements determination. The chapter concludes with the author's own evaluation and identifies the contribution which the author believes this study has made to the discipline of information systems.

8.1 Summary of the study

The study was motivated by a concern for the use of methods in the requirements elicitation phase of information systems development. The reason for the concern was that many of the methods traditionally employed in this most organisationally context-sensitive area paid little or no attention to organisational concerns from an explicit sociological viewpoint. The author maintains that in order to find out what is happening in an organisational setting then it is not only desirable but essential that the method of inquiry used includes a sociological perspective. Analyst's somewhat eclectic use of more convenient methods poses a threat to any serious progress in eliciting

requirements. Whilst this may apparently be more true for methods associated with requirements engineering, in which requirements are considered to be almost exclusively formal and hence can be 'captured', there is also a failing amongst the more human centred or situationally centred methodologies to have an explicit sociological underpinning.

The author's own expressed sociological perspective can be broadly described as aligning with agency theory. That is to say that the concern is the use of methods and techniques in analysis which aid the analyst in understanding the construction of requirements by organisational members through their continuous action and interaction. It was therefore proposed that the perspective of ethnomethodology be used as the paradigm of inquiry since it is concerned with descriptions of everyday life expressed in the words of those organisational members (actors) involved. Ethnomethodology therefore can be considered to be useful in providing valid qualitative data.

However since the elicitation of requirements pre-empts the design of an information system some useful method is required to analyse the good quality data that has been collected. The study proposes that Grounded Theory is such a method since as a method of inductive analysis it allows categories concerning the data to emerge and be abstracted such that an account of the organisation can be produced. This account is both written and depicted graphically in a hierarchical diagram of categories and is an insight into organisational behaviour.

At the outset of the study the author's understanding of ethnomethodology was that it differed from traditional perspectives precisely because of the concern for actors descriptions. The view was that from an agency perspective ethnomethodology provided not only a means of collecting qualitative data but also *good quality* data. Hence the conjunction with Grounded Theory as a method of analysis. The reflections later in this chapter challenge this view as being a restricted view of ethnomethodology since it pays little attention to the anthropological nature of ethnomethodology. That is to say the accounts

alone, no matter how rigorous the analysis, will not convey a full organisational picture.

However a number of themes deriving from the above proposal emerged and these formed the basis of further exploration in the literature search. Firstly, since the methodology proposed introducing methods from the discipline of sociology, it was important to consider the importing of methods, not least because of the existing debate concerning whether information systems can be considered a distinctive discipline. Furthermore, the introduction of another methodology into the information systems field requires consideration of information systems methodologies, not least because the proposed methodology may share common characteristics. Another important feature of the literature was the discussion of the rôle of the systems analyst, because the proposed methodology required the analyst to adopt a specific sociological perspective and this may challenge conventional rôles. Finally, the literature from information systems considered the existing methods for requirements elicitation in order to identify a 'home' for this methodology. The literature from the discipline of sociology is important in complementing the information systems literature since the interaction between the two disciplines needs to be established. The sociology literature focused on Grounded Theory as a method of research in sociology but also considered the use of the methods in practical analysis, most notably in knowledge elicitation. The perspective of ethnomethodology was also considered and again attention was given to its consideration as a perspective for requirements elicitation. A sociological justification for the use of ethnomethodology as the basis for constructing requirements was also reviewed in the literature. This was considered through an examination of Structuration Theory as a means of expressing the dualism of agency and structure as a duality. The literature therefore built upon the argument that that the combination of Grounded Theory and ethnomethodology provided a theoretical basis for practical requirements elicitation.

Essentially the argument was testing the usefulness in practice of an established and coherent theory. The selection of the research methodology in the study was important in two main ways. Firstly, it had to have been the most appropriate methodology for exploring the usefulness of methods in an organisational setting, and secondly, it had to complement the philosophical underpinning of those methods. Two frameworks were used to select and justify the research methodology. The research methodology selected was that of action case, which is based on action research but applied in this thesis to two case studies. The selection of action case over action research reflected the time and access constraints of the study and the lack of a pre-established set of ideas. The major aspect of action case is the learning that can be derived from one case that then forms the basis for the next case. The specific procedures and techniques associated with the proposed methodology were also elucidated. At this point in the study there was a break between the theoretically desirable and the testing of whether the theory stood up to the test in practice, that is to say whether or not the methodology was practically feasible.

The study proceeded to describe two action cases. It is worth considering at this point whether two cases can be said to be sufficient. The two action cases were determined by the main argument of the thesis. That is to say, the action cases were intended to test the *usefulness* of the methodology when used in a practical organisational setting. Therefore, the first action case represented the full-blown use of the methodology. The resulting learning about the methodology in one sense determined that as a full-blown methodology it was not useful within accepted project time frames but that it was useful in helping the author to gain a better understanding of the use of the methods. In the first action case time was not a constraint laid down by the organisation. The second action case was time constrained and as such represented a more realistic consultancy project whereby the sponsor needed results and was not concerned with the precise application of theory. This can be seen when one considers how other methodologies have coped with an ever increasing demand from clients for rapid solutions as noted by Bell and Wood-Harper (1992). Bell

(1996) reflects on this use of 'half-way house' methodologies as providing the 'hands on' use of methodologies which retain the guidance of the original. Therefore the second action case was needed to test an adapted methodology whilst maintaining the philosophical underpinnings or *essence* of the original methodology. The resulting learning suggests that the practical outcomes were positive but that the methodology in its adapted form could not justifiably be said to be useful since much of the structuring of the data was due to the rôle of the analyst rather than the methods used. A third action case would no doubt have been useful learning also but given the research questions and the scope of the study it was not completely justified.

In the next section a framework is used to evaluate the methodology. After the first action case it was considered that the methodology be named and GIST (**G**rounding **I**nformation **S**ys**T**ems) be used to mean the adapted methodology. The evaluation which follows therefore extracts more learning from the study by pointing to the deficiencies and strengths of the methodology in its current form.

8.2 Evaluation of the GIST methodology using the NIMSAD framework

In this section an evaluation of the GIST methodology is presented. The structure of the evaluation is given by NIMSAD (Jayaratna, 1994) which is a systemic framework for understanding and evaluating methodologies in general but whose use has been in the evaluation of information systems methodology in particular. The evaluation therefore considers the four elements of the NIMSAD framework: the problem situation; the methodology user (intended problem solver); the problem solving process; an evaluation of the first three elements. Within the third of these elements, the problem solving process, eight stages are considered and these are: understanding of the 'situation of concern'; performing the diagnosis; defining the prognosis outline; defining 'problems'; deriving the notional system; performing conceptual/logical design; performing the physical design; implementing the design. In the text which

follows the first five of these stages are used since the final three are out of the scope of the GIST methodology.

The reasons for using the NIMSAD framework for evaluation is the appeal to the author of the treatment of both intellectual as well as practical activities associated with methodology and the express outcome of the framework to encourage reasoning and questioning. Also NIMSAD provides a three pronged perspective which very much complements the author's perspective. Firstly NIMSAD is concerned with the view and the rôle of the analyst during the intervention. Secondly it is concerned with questioning the methodology itself in terms of the stages and steps that the methodology offers and finally and perhaps most importantly provides questions. This final questioning is of course the basis of critical reflection and evaluation and is concerned with process and not simply the products. The strength of NIMSAD in this regard is not that every question should be answered but that the relevant questions lead to further self questioning on behalf of the person using the framework. Alternative frameworks for methodology evaluation and classification were considered such as Olle et al. (1991); Flood and Jackson (1991); Episkopou and Wood-Harper (1986) but perhaps the strongest candidate was 'The Four Paradigms' (Hirschheim and Klein, 1989) (figure 2.5 in this thesis) because it helps to explore the social consequences of intervention by systems analysts. However whilst the framework could give useful insights particularly for the rôle of the analyst it primarily classifies methodologies rather than evaluating them. Thus the author preferred to use NIMSAD

"Without operating at a conscious level of concern, we will be in no position to help others" (Jayaratna, p.xix, 1994)

8.2.1 Element 1. The problem situation

GIST is concerned with the requirements determination process but more precisely with the organisational members or actors who are likely to be affected by the introduction, or proposed introduction, of information technology. The concern for the actors in the problem situation is underpinned

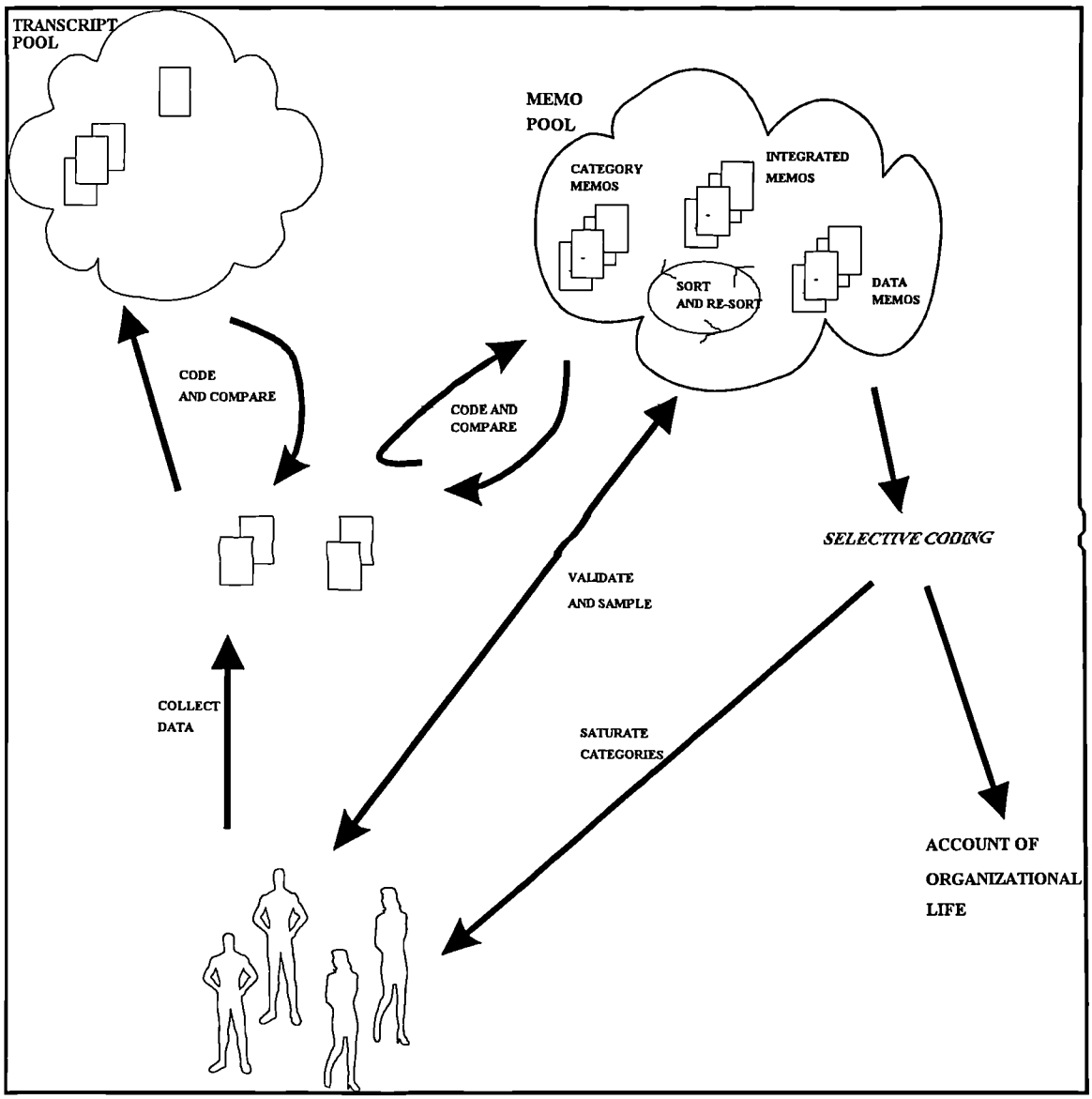


Figure 8.1 Procedures associated with the Grounding Information Systems (GIST) methodology

by the perspective of ethnomethodology (Garfinkel, 1967) which maintains that individuals have language-based and interaction-based competencies through which the observable orderly features of everyday life are produced. In other words ethnomethodology is a concern for common sense reasoning and understanding expressed by people in their everyday activities. This implies two important properties. Firstly, that meanings are *indexical*, that is, they depend on context, and it is only in the situated use in talk and interaction that objects and events become meaningful. Secondly, that social realities are *reflexive* since the interpretive activities are both in and about the social

settings they describe. For the GIST methodology the perspective of ethnomethodology provides for the methodology user in intellectual terms a paradigm for inquiry and in practical terms gives scope for the collection of high quality data, that is in the actors' own words. Driven by such a paradigm for inquiry, the methodology is much more subjective and less rigorous when compared with the scientifically-based methods of requirements determination usually associated with formal methods or requirements engineering. In these approaches the main rôle of the requirements engineer is to be almost exclusively concerned with the formality of requirements and hence be able to 'capture' them and typically the concern of the requirements engineer is to capture those requirements which have functional properties which can later be decomposed into software modules, thus tending to ignore the global or systemic properties of the problem situation.

Therefore the GIST methodology, it could be argued, has more relevance than these scientifically-based approaches since it is explicitly concerned with the systemic nature of the problem domain.

The practical analysis stages associated with GIST are based on the social science research method The Discovery of Grounded Theory (Glaser and Strauss, 1967) and are represented diagramatically in Figure 8.1.

In GIST the organisation, which is the problem solving domain, is considered in terms of the actors who act and interact to create and recreate meanings. Therefore, whilst the methodology stresses the importance of terms of reference and the establishment of initial seed categories for the analysis, the paradigm of inquiry places no individual actor's words or actions above those of another. There is a potential problem with this since, for the interventions described, the terms of reference and hence the seed categories will almost exclusively be derived from the sponsors of the study and they will almost exclusively be senior managers in the organisation. How can this be considered ethnomethodology? The methodology as presented considers the practicalities of the methodology, that is the means which enable the method to be useful as

taking precedence over the absolute adherence to the theoretical or indeed philosophical aspects of the method. It would seem that what is proposed is in some sense the *essence* or *spirit* of ethnomethodology. Indeed, Button and Sharrock (1992) comment on a similar problem situation where practical priorities became dominant features in the use of a methodology, and it is the fact that the use of a methodology (in their case a methodology for information systems development) 'instantiates ethnomethodological themes' that is of interest.

Two further features of the GIST methodology are the degree to which a mutual understanding is required prior to any intervention regarding the underlying perspective, and the participation of the actors in the validation of the interim and final account. In the two problem situations such an understanding was reached. However it would be difficult to pursue the use of the methodology in a problem situation where such agreement could not be reached, for example, where the organisational culture was not conducive or where the management style relied on control rather than co-operation for the staff. The GIST methodology shares this problem with the ETHICS methodology (Mumford, 1983a, 1983b) which proposes an argument based on a value system which needs to be mutually accepted (ie shared) if the intervention is to be useful or successful.

Finally, the GIST methodology clearly has a client focus. The client is the management team or the single managing director who sponsors the study and agrees the terms of reference. The rôles of the other actors who are involved in the study are less clear. Their rôle is not benign since they are involved in validating interim findings, but nor is it the aim of the methodology to emancipate the actors. The use of the term 'problem owner' may most closely articulate their rôle when used in the sense that Checkland and Scholes (1991) intend for the Soft Systems Methodology (SSM). However the lack of an explicit rôle in the GIST methodology for the problem owners may cause difficulties particularly for the methodology to be used by its users other than the author of this study.

8.2.2 Element 2. The methodology user (intended problem solver)

In this element there is an examination of how GIST helps its users to assess their own 'mental constructs' and whether GIST alerts its users to the need for developing their 'mental constructs' to a desirable level in order to apply the methodology successfully. For clarification the 'mental construct' as articulated by the NIMSAD framework is characterised by: perceptual process, the perception of reality which determines what information is significant; values, which are beliefs that are considered by the individual to be 'good' without question; ethics, which are the standards which are placed on a person's expected behaviour by others; motives, which are personal needs which individuals try to satisfy but keep hidden from others; prejudices, which are persistent opinions formed from an individual's experience or insecurity; experiences, which are a source for developing knowledge and skills; reasoning ability, which is the ability to abstract essential aspects from any situation and understand concepts underlying thought processes; knowledge and skills which are acquired from education, training and experience; structuring processes, which are the means by which we structure our thinking and action (sometimes called methodologies); rôles, which are the explicit behavioural characteristics that can be attributed to someone responsible for performing a set of tasks; frameworks, which are static structures or meta-models which show the connection of a set of models; and models, which are aids to develop reasoning abilities which may be derived through experience or conscious training or by conscious effort in engaging in debates, discussions and reflections. Consideration is given below to those which are strongest in the GIST methodology.

The GIST methodology alerts the actors in the study to the need to consider a perspective for understanding the problem situation. The extension of this is the need for actors to validate not only what they said but also to validate interim and final accounts which are abstractions from their own interviews. This involvement of the user questions their perceptual processes since they are required to consider the problem area and the structuring of the problem area

as being their responsibility as much as it is the responsibility of the client (sponsor). Although no explicit new skills or knowledge are gained by the actors their reasoning ability is challenged since through the validation process they must follow the abstraction that has taken place through analysis and comment. This is not the same as simply agreeing, say, to a data flow diagram as a true representation of data flow in the SSADM methodology, but requires consideration and understanding of the account and a coherent response. Although there is no explicit intention in the methodology to educate the actors in the methodology or to challenge their existing ethical beliefs as a few methodologies do such as ETHICS, nevertheless it is clear that involvement with the methodology does strengthen the co-operative or participative view that the actors have with respect to their rôles in the organisation. However there are no explicit criteria within GIST which may be explored to validate this co-operation.

The GIST methodology relies heavily on the analyst being able to alert the actors in the study to the need for developing mental constructs. Unlike SSM, for example, where the methodology consciously attempts to build knowledge and notions of 'systems' and to develop conceptual and abstract skills, GIST implies this development through its rationale but not explicitly through its steps. The methodology therefore can be criticised for the lack of direction in action for the analyst. This may indeed lead to the use of the methodology in some neutral sense of inquiry simply as *procedures* for analysis, or worse, the use of the methodology by a system 'expert' whose attention to the ethnomethodology perspective and the value of validation is scant if indeed present.

8.2.3 Element 3, stage 1. Understanding of the 'situation of concern'

In this stage the NIMSAD framework is concerned with how the boundary of the situation is established since if 'problems' lie outside this boundary then they can never be addressed.

In the GIST methodology the boundary construction is heavily, if not exclusively, influenced by management goals. In each of the action cases this is expressed as terms of reference for the study in which clear management objectives are set. In terms of the methodology, this is translated into the seed categories which form the basis of the data collection/interviewing. The establishment of the terms of reference is in conflict with the stated paradigm of inquiry, namely ethnomethodology and indeed with the inductive nature of the analysis, Grounded Theory, since these would imply that each intervention must be approached with an open mind and with no stated end point. However the redeeming point about the GIST methodology is that part of the debate regarding the terms of reference explicitly engages the management or sponsor in understanding that in the finding-out process the methodology may throw light on unexpected elements which will not be discarded. Indeed, such is the regard for the actors' own opinions, that the actual words used by the actors were considered to be paramount and never disregarded. The methodology may therefore be considered to be pragmatic rather than philosophically flawed.

GIST is explicit in how the information will be gathered. The core categories form the basis of introductory questions in semi structured interviews which were taped. The interview lengths were not fixed but generally lasted between 30 minutes and 60 minutes. Each interview was transcribed. The specific interview technique followed the pattern whereby the analyst introduces the key areas that are to be covered and then for each area allows the respondent to discuss the area and where clarification is needed then the analyst asks for example 'Why did you say..<phrase>?' or 'What do you mean by..<word>?' It is a key part of the data collection process that the analyst does not introduce concepts or lead the interviewee to make explanations in terms of the analyst's perspective or point of view. The interviews were described verbatim and included pauses and interjections, for example for laughter. No attempt was made during the transcription to 'tidy up' the interview in terms of grammar or the use of colloquial expressions. Where there were groups that acted together in work situations then the interviews were carried out with the group. In that particular situation the analyst allowed respondents to cut across each others'

answers and allowed respondents to confirm and discuss their replies with each other.

What is unclear from the methodology is how supporting material such as organisation charts or management reports are gathered and how these are investigated. Therefore, whilst great attention is paid to the situational information, there is little to aid the analyst in the investigation of the formal characteristics of the situational information. There is some evidence in the HVP action case that more formal information was collected but since the process moves away from the paradigm of inquiry it was difficult to accommodate. The stated reason for moving from the ethnomethodological perspective is to consider the formal systems as being embedded in the situational. However, this aspect of the methodology may, for these reasons and in those instances, lack rigour. In general however the techniques associated with understanding the 'problem of concern' do support the mental constructs discussed above.

8.2.4 Element 3, stage 2. Performing the diagnosis

In this element NIMSAD is concerned with what is done with the information that is gathered. For the GIST methodology the gathering of the information and the diagnosis take place at the same time. However these are conceptually different processes and are therefore treated differently in this evaluation.

In many ways this stage of the GIST methodology is its strength. It relies heavily on the procedures outlined by Glaser and Strauss (1967). At this stage the methodology presents explicit methods of analysis supported by a software package. In brief this stage begins by the 'open coding' of interview transcripts representing indexical expressions from the interviewees. The purpose is to open up the inquiry into the data and any part of the data may be relevant. The software package is used here to build up essentially lists of codes represented in the package as a single level tree structure. At this point also 'memos' are prepared for the transcript and for codes which interest the analyst. As the number of codes increases (usually because the number of transcripts increase)

then more abstract categories can be formed which indicate an incident or a phrase or a process. Codes can then be merged into categories or form part of sub-categories and a hierarchy of categories grows as analysis progresses. The categories must be repeated in the data in terms of their properties and dimensions and further analysis of transcripts serves to confirm or refute their contribution to the emerging 'theory'. Axial coding is the next level of analysis in which the analyst relates categories to sub-categories and tests the relationship between the categories against the data. The testing against the data will usually indicate that the analyst must review the transcripts or may return to a respondent to clarify or elucidate quite specific points in order that a category or sub-category can be 'saturated'. The saturation occurs when the collection of further data or further analysis can add no further to the properties of the category. Towards the end of the coding it is the aim of the analysis to unify all categories around a *core category*. This process is known as selective coding. At this point the major abstraction of the data is identified and all sub-categories are fully saturated. Although the hierarchy of categories represents the core category at the top, the process leading to the establishment of the core category will have identified and discarded perhaps a number of other possible core category candidates. The memos at this stage are also more fully developed and lengthy and include not only properties of categories but also the process leading to the selection of the core category. At this stage the software package facilitates the development of the hierarchy of categories and their integration, and the writing of memos.

In terms of the NIMSAD evaluation at this stage the procedures and analysis described, as a form of expression of the 'situation of concern', help the methodology users to understand the reasons for the situation. What is important at this stage is that, whilst unable to express the full complexity of the situation, the procedures help to alert the 'mental constructs' of the methodology users and the client to the features of the situation which are important or at least have some significance. However this may be attributed more to the interview techniques than to the methodology itself. Another important element of the diagnosis is the emphasis on the validation of both

interim and final accounts which explicitly enables communication with the actors and the client in order to derive a common (ethno-) understanding of the situation. The outcomes of the diagnosis therefore provide a rich situational perspective. However, there are problems with the explication of more formal processes and procedures, and the tools and techniques of the GIST methodology are unable to deal with this. Although attempts are made in the action cases (especially HVP) to overcome this shortfall by considering the formal systems as embedded within the situational, it remains unclear in practice how this is to be achieved. The GIST methodology must address the paucity of techniques to deal with this.

A further criticism of the diagnosis is the extent to which the analyst makes interpretations of the data during the analysis. A clear example of this is in the selection of the core category and other categories. Whilst validation is stressed in the methodology, the validation is restricted to the acceptance or otherwise of accounts and not the development of categories. There is a danger that the validation process becomes treated as a 'sign off' rather than a participative process and the methodology has no tools for alleviating such a problem. Indeed the worst danger is that the diagnosis represents the analyst's 'mental constructs' more than the users' 'mental constructs'.

8.2.5 Element 3, stage 3. Defining the prognosis outline

At this stage of the NIMSAD framework the question that arises from the previous stages is 'so what?' That is to say that this stage is concerned with the desired or perceived state of the problem situation. The concern of NIMSAD is whether the users of the methodology are alerted to prognosis outline.

For the GIST methodology the users are alerted to the desired state or prognosis outline through the validation of interim accounts in memos and also the final account. It is an interesting aspect of the methodology that some of the weaknesses described in the diagnosis stage are in fact strengths in this

stage. This is because the strength of the methodology is to provide an *outline* of the desired state and not specifically the *content* of the prognosis model. Therefore, whereas in the diagnosis there is a problem about the lack of tools to diagnose the formal systems, the impact in this stage is that the users have an uncluttered (ie non-design oriented) perspective for the problem situation and thus they can begin to understand why change - which may be the introduction or enhancement of a technical information system - needs to take place. At this stage the GIST methodology explicitly alerts users and clients to the perceived desired state for the problem situation. However, as noted in the diagnosis stage, the tools for validation are weak and in fact depend heavily upon the interpersonal skills of the analyst. The danger therefore is that the opportunity to exploit this stage may be lost. The author became conscious to the substitution of his skills in this process only when evaluation was undertaken.

8.2.6 Element 3, stage 4. Defining 'problems'

At this stage the NIMSAD framework is concerned with the extent that the methodology deals with understanding what it is that prevents the diagnosis outline (current state) from changing to the prognosis outline (desired state).

The GIST methodology does not have a set of tools and techniques other than those described in the diagnosis outline to enable the understanding of the gap between 'current' and 'desired' states. This is because the analysis of transcripts is an inductive process and also an iterative process in the sense that data collection and analysis take place at the same time. It may be considered fairly artificial therefore to consider the NIMSAD stage of defining problems as being discrete. However because of the insight and structure afforded by NIMSAD as an evaluative framework it is worth considering how the analysis methods associated with GIST help users to understand the gaps between 'current' and 'desired' states.

The power of the analysis methods lie not so much in defining categories and their properties but more in the emerging theory which develops through memo

writing which, although described in detail in chapter five, is summarised here to identify those elements of memo writing pertinent to this 'defining problems' stage. Memo writing begins as soon as the first codes are developed from the first transcript. They are the development of ideas and whilst in part they may concern details about people, events or interactions they are also used as indicators for an analysis that is set in a conceptual frame. The memo is the means by which categories are identified as being integrated with other categories and also the means by which sub-categories are related to higher categories. As the development of category building proceeds, that is to say as categories become saturated, then the memos become more reflective on the current and the desired states, to use the NIMSAD terminology. Thus the 'gaps' between these two states, whilst in the early stages of the analysis being a form of conjecture, later develop as emergent problems from the data through the memo writing process. The final account of organisational life is not only a reflection or analysis of the current and desired states but is also the means of communicating the problem definitions. This can then also be seen in the hierarchy of categories which at the most abstract levels highlight these problem areas.

A criticism of the GIST methodology at this stage could be levelled at the rôle played by the client or sponsor in the first stage of understanding the problem of concern since the terms of reference of the study and the establishment of seed categories may be said to have already identified the gaps between the 'current' and 'desired' states or at the very least to have identified the 'desired' state in the minds of clients and the problem solver. There are two elements of the methodology which may mitigate this and these would be firstly the use of an inductive method of analysis in which new categories may emerge that had not been identified in the terms of reference (there is evidence of this in the FP UK action case) and secondly the initial agreement in the terms of reference that enables the openness of the method to ultimately disagree with the client/sponsor. However there is nothing in the methodology to deal with the political or power relations between analyst and client/sponsor and this must therefore continue to be an area of concern.

8.2.7 Element 3, stage 5. Deriving notional systems

The NIMSAD framework defines notional systems as those which need to be developed if the organisation is to overcome the 'defined problems' of the previous stage. For the GIST methodology this may be considered to be the final stage of this element since the documentation associated with the description of the notional systems may be considered to be those that give rise to the expressions in the requirements specification. That is to say that with respect to the NIMSAD framework the GIST methodology is concerned with the 'problem formulation stage' or the 'systemic analysis' phase. Jayaratna (1994) defines systemic analysis as

"...the critical enquiring process using the notion of 'systems' for defining notional system(s) that is (are) considered as relevant to the 'situation of concern'. The problem formulation phase activities involve the critical examination of the rationale for the current and desired states, formulation of problem statements and hence the identification of relevant notional system(s). Systemic analysis is simply the use of 'systems' notions in the problem formulation phase of a problem solving process." (Jayaratna, p.92, 1994)

The GIST methodology describes the features of the notional systems in three main ways. The first is the hierarchy of categories which at the highest level give the most abstract formulation of the definition of the problems. The second is in the organisational account which explicates each of the categories, and the third is in the recommendations to the organisation in which the relevance to the problem area is discussed to identify features which prevent the 'current' state from becoming the 'desired' state.

Whilst these elements are present in the methodology what remains unclear is the process by which the account and the hierarchy diagram enable the recommendations to be drawn. Indeed in the action cases the recommendations remain heavily influenced by the terms of reference and this continues to be a persistent problem. That is to say, the pragmatic application of the methodology may in fact prevent the systemic analysis from producing worthwhile (ie ethnomethodologically sound) recommendations.

The remaining stages of the NIMSAD framework, performing the conceptual/logical design, performing the physical design and implementing the design do not form part of the GIST methodology. Yet the omission of these remaining stages does raise some questions regarding the usefulness of GIST specifically as a problem solving methodology as opposed to a general problem structuring methodology. A problem solving methodology must address problem formulation, solution design, design implementation and evaluation. It may be argued however that there is no need to provide explicit links between GIST and the later stages of design and implementation of an information system. GIST can be classed as an information system methodology since that is the domain in which it has been used and the analyst/author is firmly placed within the information systems discipline. Indeed SSM is often referred to as an information systems methodology rather than a general problem solving methodology because it has frequently been applied by information systems analysts. This argument about domain is less important than the stages covered by the methodology indeed for GIST it may be considered not as a problem solving methodology but simply as a way of structuring one's thinking and action in an explicit way.

Therefore the account of organisational life provided by GIST represents the situated requirements of the organisation. It may therefore be complemented by more formal requirements elicitation methods. What is important, as Goguen (1994) notes, is that

"..information that is heavily situated should come with pointers to its context ....This should help us to effect an ongoing, practical reconciliation between formal technical issues and socially situated issues in the actual ***practise*** *of requirements engineering, as is needed for building systems that work successfully in their social context."* (Goguen, p. 194, 1994 (Goguen's emphasis))

GIST provides the necessary pointers to the situated requirements. The problem of reconciliation is outside of the scope of this thesis.

8.2.8 Element 4. Evaluation

The NIMSAD framework considers this element to be the most important element of the framework since no problem solving process can be considered to be complete until evaluation has taken place. In the GIST methodology there is no explicit stage to evaluate the outcomes from the methodology, which, on considering the methodology in its entirety, ought to follow the production of the final account of organisational life and lessons learnt from the intervention. As discussed above the methodology may be considered to be a problem formulation and not a problem solving methodology because the mechanism for the problem formulation element is taken from the sponsors of the study. It may be reasonable to assume that some implicit evaluation of the methodology takes place because of the high reliance by the methodology on user and client/sponsor validation which is also true of many methodologies which do not perform problem formulation. This is no substitute for a more structured evaluation stage but it provides the basis for considering how a well-structured evaluation stage may become part of the GIST methodology, and this is discussed below.

The evaluation should focus on whether the client's concerns with respect to the problem situation were clearly expressed and whether the methodology enabled the client both to fully understand the issues and to commit themselves to the intervention. For GIST this is established through the terms of reference and the seed categories, and most importantly through the common understanding and acceptance of the paradigm of inquiry and the methods to be used. The evaluation stage should determine the degree to which this understanding was established. Clearly it is also important that the objectives of the terms of reference were met after the intervention, and if they were only partially met then the reasons need to be articulated in order that the methodology can if necessary be adapted. Since the methodology is concerned with problem formulation then it may also be necessary to consider the degree to which the recommendations from the intervention were followed by the organisation in practical terms. That is to say the requirements arising from the

notional systems. It is easier for example for an organisation to give tacit acceptance to a set of recommendations and then do nothing than it is to use the recommendations as a basis for future action. It is difficult to see how evaluation of this type may take place, particularly since the analyst may have become removed from the situation following his or her intervention. It may be that the methodology requires the evaluation stage to last beyond the intervention in order that the evaluation of the terms of reference can be properly completed.

In common with many other problem solving methodologies (Jayaratna, 1994) the evaluation of the methodology user is not covered even implicitly by the GIST methodology. The NIMSAD framework suggests that if it were present then it would enable the methodology user to increase his or her competence in the use of the methodology. Certainly the NIMSAD framework suggests pertinent questions that can be asked of the GIST methodology with respect to its users which would be useful.

The GIST methodology, for example, is concerned with a common understanding of the paradigm of inquiry - ethnomethodology. Questions would therefore need to be asked when evaluating the methodology as to whether this was achieved and whether the establishment of the common understanding had an effect on the intervention. This is particularly pertinent if the methodology user is not the methodology creator. Could the methodology be used by anyone who did not share the philosophy espoused in GIST? In the action cases that have been presented there is no evidence either way. Thus if the methodology is to be used more widely then this explicit evaluation of the methodology user should be incorporated into the methodology since without it the likely scenario is the indiscriminate use of the methodology.

The NIMSAD framework makes the pragmatically based observation that no methodology operates exactly according to its predetermined structure when applied in some given situation. Therefore the evaluation at this stage is concerned with the 'degree of assistance' that GIST might offer in terms of its

models and procedures. In this respect there is some indication that, through the validation of both interim and final accounts, users, client and sponsors are relied upon to 'evaluate' the analysis. However this is not formally noted in the methodology and is much more evident in the presentation of the methodology as an action case where learning about the methodology is presented as a research outcome rather than a practical outcome. It would seem that there is some benefit in restructuring the methodology so that validation of the accounts is also associated with evaluation of the methods. The benefit of this would be the use of GIST not only as a problem formulation methodology but also as a learning vehicle for both methodology user and others involved in the intervention.

8.2.9 Summary

The use of a well structured systemic framework for understanding and evaluating the GIST methodology has identified a number of important issues that complement the learning from the action case studies. The main points are shown in figure 8.2 and explored in more detail below. Firstly it identifies that the paradigm of inquiry, ethnomethodology, is used as the essence of the intervention, that is, a concern for the words used by the interviewees in the study as being the description of reality in an epistemological view of the system, and not the 'expertise' of the analyst providing the ontological view of the system. But it is accepted that this 'pure' ethnomethodology is tempered with the practical necessities of satisfying the agreed terms of reference. It is this which distinguishes GIST as a practical intervention methodology from its roots in the social sciences as research-oriented. When related to the research questions of the thesis, it is this point about the usefulness of a methodology which is derived from social science research methods that is addressed here. The methodology has moved significantly from its origins in the social sciences. As such it may be considered to be an adapted social science methodology which has been adapted to the field of information systems. It is therefore important that the third research question which relates to defining boundaries of the information systems discipline is also addressed. If it is accepted that

GIST is an information systems methodology then does it build on and extend or clarify existing pre-theory frameworks in the information systems field (Adam and Fitzgerald, 1996)? The author would maintain that it does since in the problem diagnosis phase, using the NIMSAD terminology, the GIST methodology complements the work of Checkland (1981) and Checkland and Scholes (1990) by providing explicit procedures for establishing an accommodation of world views or Weltanschauungen.

The use of the NIMSAD framework has identified rôles for the systems analyst not normally associated with traditional or scientific methods of problem formulation or requirements determination. The rôle of the analyst is to bring the interviewees into the structuring process through the validation of interim and final accounts, and in stressing the importance to the interviewees of their own words, the analyst is educating the participants and engaging them to consider their ethical position. However, this final element is not explicitly part of the methodology. In relating this to the research questions of the study, the methodology does redefine the traditional analyst's rôle. Indeed it challenges the rôle of analyst as defined by methodologies such as ETHICS and SSM since it requires of the analyst not only to engage the participants, as both ETHICS and SSM do, but also to understand and accept an explicit sociological perspective, ethnomethodology, as the paradigm of inquiry. This may be considered burdensome for the systems analyst but as Walsham (1993a) and Hirschheim and Klein (1991) argue it is through the articulation of underpinning assumptions and an express statement of an ethical position that creative information systems solutions are more likely to be attained.

Also, individual analysts who facilitate learning or aim to educate participants can enable them to be economically more productive for the organisation. One may see therefore that an aspect of the analyst's rôle is to enable participants in the intervention and in the case of the GIST methodology to give ownership of the problem and the problem definitions to the participants and not to claim that ownership for themselves.

issue	learning
ethnomethodology as a paradigm of inquiry	'pure' ethnomethodology is tempered by practical constraints but retains the concern for the users (actors) own words
rôle of analyst	the rôle is to bring the interviewees into the structuring process - to enable and to educate
rôle of methodology creator	GIST may be too personalised and over rely on its creator
GIST as problem formulation methodology	GIST may have begun as a methodology for requirements determination but may be more generally used for problem formulation
evaluation stage	GIST needs an explicit evaluation stage because the current stage is insufficient to measure the success of the intervention.

Figure 8.2 A summary of issues arising from the evaluation of the GIST methodology

A further issue that the NIMSAD framework has helped to articulate is the rôle of the creator of the methodology as the analyst for each of the action cases. It is beyond the scope of this study to have other analysts or indeed groups of analysts involved in the use of the methodology but it raises a number of questions about whether in its current articulation or presentation that the methodology is portable and could be effectively used by others. The danger as noted above is that like the ETHICS methodology, the creator of the methodology is the most skilful exponent because the methodology relies heavily on the personal ability set and applied philosophy of the creator. Indeed it may be argued that in addition to the personal ability of the creator it is the interviewing techniques rather than the methodology that are the key to the usefulness of the methodology.

The structure of the NIMSAD framework also raises a perspective on the thesis not formally presented in the original conceptual framework. The GIST methodology was originally proposed as an approach to requirements determination and yet the NIMSAD framework becomes no longer useful for GIST after the problem formulation stage. It may be argued then that GIST is

a general problem formulation methodology whose usefulness in the information systems discipline is in the requirements determination phase where the analyst is more interested in the situational rather than the formal systems and where the aim of the methodology is not simply to help inform future intervention but also to enable the participants of the study to own the notional systems which emerge. That said, it is clear that the action cases presented in this study are insufficient to test the generality of the GIST methodology in domains other than those associated with information systems.

Finally the NIMSAD framework has pointed to the need for an explicit evaluation stage which may involve an extended period beyond the intervention. The reasons for this are given above but, briefly put, there is nothing in the methodology to establish the degree to which the intervention has met the terms of reference or whether recommendations are followed. Also, there is no evaluation of the degree to which the interviewees/users feel ownership of the notional systems. The extent to which evaluation does occur is through the validation of interim and final accounts of organisational life which in terms of the ethnomethodological perspective may be sufficient but in terms of a useful methodology which must adapt in action is insufficient in practice.

8.3 Evaluation of thesis objectives

In this section attention will be given to discussing the degree to which the objectives first expressed in chapter one have been met. The objectives are repeated below for clarity. The first two are taken together.

- Developed a methodology for intervention in the requirements determination phase of information systems analysis. The methodology will be based on methods and a perspective from the social sciences and an action case approach;

- Evaluated the use of Grounded Theory and the ethnomethodology perspective as the basis for requirements determination in

information systems analysis. In particular the study will progress the understanding of the framework of ideas and the methodology through two iterations of the methodology in action. The expected outcome is that the framework and the methodology will be adapted through these iterations and thus a practical insight will be gained into the usefulness of the methodology which complements the theory presented in the literature search;

The conceptual basis for the methodology has been developed and it is presented in chapter one with the attendant literature in chapters two, three and four. The *development* of a methodology was only partially completed in the context of the understanding gained in the intervention activities and use of Grounded Theory ideas in an information systems domain.

The early understanding by the author of this conjunction of methods from the social science was essentially that a research based conjunction could be useful in practical systems analysis situations. What became clear during the study was the extent of the ambitious nature of this premise for two main reasons. Firstly the practical constraints of a consultancy project necessitate the adaptation of methods in order to meet practical goals. In a research situation these constraints generally can be known in advance and be accounted for or their affects mitigated. Therefore during the studies changes were made to the original conjunction which led to an adapted methodology. Whilst the second objective of the study indicates that this was likely and indeed desirable, the extent of the change was such that only in the NIMSAD evaluation at the beginning of this chapter it is noted that the use of the methodology moved significantly away from the original conjunction. It is recognised that at the end of the studies the practical consultancy objectives of the two studies were met but the extent that this could be attributed to the use of the methodology has not been established. Indeed the NIMSAD evaluation also questions whether it was the author himself and his own skills in the consultancy domain that that gave the information required or whether it was the methodology. That is to say was

the *structuring* process from the authors own skill set? On reflection over the two action case studies it is reasonable to assume, given the stated adaptations to the methodology, that the structuring process was heavily influenced by the author as consultant. Reasons for this become clearer when considering the second reason for the ambitious nature of the work undertaken.

At the outset (section 1.6) the author draws attention to one of the limitations of the study being the author himself and his view of information systems development. On reflection it was perhaps naive to borrow from a reference discipline without the experience and understanding of having used the methods as research methods in that reference discipline area. In section 3.2 Pidgeon et al. (1991) warn against the use of the procedures associated with Grounded Theory by novices. Elsewhere in the same section Strauss and Corbin (1994) warn against the use of Grounded Theory by those who have not studied it in depth and received formal training in the procedures. The author certainly fell into these categories. A full exposition and critique of the literature is no substitute for practical experience. Hence as mentioned above the author relied on his practical experience from his own discipline to apply methods of a reference discipline.

On balance then these two objectives which formed the conceptual basis of the thesis have not fully been met. However what must not be overlooked is the learning which emerges from the thesis and the contribution that the learning makes to the information systems field, as discussed later in this chapter.

- Investigated the area of information systems methodologies in general through the literature. The empirical study will have developed a methodology for requirements determination and the learning that can be articulated from the empirical work will be used to complement or critique the existing literature. The result will be an informed evaluation of the methodology in the study in particular

and a discussion relating to information systems development methodologies in general;

This objective is covered in chapter one and later in the literature in chapter two. This objective has been met partially since the area of methodologies has been investigated and the role of the methodology of the study with respect to this has been established. However the objective specifically sets out for the study an end point which is a methodology for requirements determination. To that end this has not sufficiently been demonstrated. Indeed the most that can be said for the methodology is that it is a general methodology for problem formulation. The extent to which it relates to other methodologies in information systems is not sufficient to add significantly to the discussion of information systems methodologies in general other than to claim that the experience of the author in going through the process of methodology development suggests that the using the methodology conceptually, assisted in the understanding of the problem situation and aided learning. The informed evaluation of the methodology is given using the NIMSAD framework at the beginning of this chapter.

- Studied and evaluated the two broad approaches to requirements determination which may loosely be characterised by the formal requirements engineering approaches and the situationally based post-modern approaches. The empirical work will build upon the situational approaches such that insight can be given into the value of such approaches in requirements determination for information systems;

The study of two perspectives of requirements determination are given in chapter two. The empirical work does indeed suggest that situationally based approaches serve two main purposes. The first is to help inform future interventions in the problem domain and secondly to enable the participants of the study to own the notional systems which emerge. However it is not possible to determine the value of this with respect to

requirements determination. This is because as noted above the methodology's practicability needs to be established by practitioners other than the author and that the adaptation of the methodology during the studies was such that it is insufficient to say whether the methods and the perspective from the social science field are useful.

- Studied the rôle of the systems analyst from a historical perspective drawing upon research which enabled the rôle to be defined. This context will have enabled a fuller explication of the current rôle and a consideration of the rôle of analyst in the light of the proposed methods of analysis used for the study. In particular it is expected that an understanding of the rôle of the systems analyst with respect to the use of social science methods will be key to the usefulness of the proposed methodology.

The rôle of the analyst is discussed in chapter two and also at the end of each of the action cases in chapters six and seven.

A full discussion of the rôle and an evaluation based on the study is given in section 8.4. This objective was met since the author as analyst was able to reflect on the two rôles and the dilemma that this raises. The additional personal dilemma between researcher and consultant is discussed in 8.5.

The problem faced by the analyst is that the traditional rôle views requirements determination in a scientific sense of 'capturing' requirements whilst the situated approaches view requirements in a socially constructed sense. Hence, if that latter view is dominant, the need to use social science methods to determine requirements. The problem, certainly at this point in the development of information systems field, is that an understanding that social science methods may be appropriate is not the same as being able to effectively use those methods in a technically dominant field such as information systems. As the author points out earlier in this section the limitation is in the analyst's previous experience with such methods. The author of NIMSAD points out however that within an educational context every researcher is a novice in the

use of research methods when applying them in a new environment, especially within a new discipline. The issue has certainly been addressed by the study but it is the learning that arises from a flawed use of the social science methods that enables the author to urge caution for future analysts.

8.4 Discussion of research questions

This section will return to the research questions presented in the opening chapter and specifically consider the extent to which they have been answered or indeed altered by the study. The discussion will point to either accepting or rejecting the research questions on the basis that they either do or do not relate to the theoretical framework. Each of the questions will be taken in turn and are repeated in this section for ease of reading.

1. Is it possible that methods more commonly associated with the social sciences be used by a systems analyst to assist in the requirements determination process?

    1.1 In particular can the 'Discovery of Grounded Theory' method be used with an ethnomethodological perspective to provide a useful methodology in requirements determination?

This question is the main thrust of the argument of the study and the primary question to be answered by the empirical work. The empirical work has shown in both of the action cases that it is indeed possible to use social science methods in the requirements determination process in a technically dominant field such as information systems. In both cases the use of the methods led to recommendations for further action which were adopted by the sponsor of the study. Also the action cases maintain that the methodology for intervention was useful. However the first research question was raised with respect to the use of the social science methods in the form in which they are presented and understood in the social sciences. To that extent the research can be said to suggest that the original methodology - ethnomethodology and Grounded Theory - is not useful. During the research process and through the learning

that has taken place the original methodology has been adapted. The main conclusion is that the wholesale adoption of these social science methods is too time consuming, particularly in the transcribing, coding and comparing associated with the data analysis. The question is whether adapting the methodology to make it useful, given the constraints of practical consultancy situations, may be considered to be moving so far from the original methodology that it carries the essence of Grounded Theory and ethnomethodology but not in its entirety. This is because in the methodological context the intended methodology does not turn out to be the same as the methodology-in-action because of the dynamics in the situation (Jayaratna, 1994). The author would maintain that rather than rejecting the original philosophy of the approach, the pragmatic use of the methodology is a post-modern approach which can be considered to mean that it relies less on dogma and positivist validity models and more on the practical application of methods to suit real situations. As Lincoln and Denzin (1994) note

"...a text [account] is valid if it is sufficiently grounded, triangulated, based on naturalistic indicators, carefully fitted to a theory (and its concepts), comprehensive in scope, credible in terms of member checks, logical and truthful in terms of the phenomenon in question." (Lincoln and Denzin, p.579, 1994).

The post-modern position which suggests that no method has any privileged position over another and that validity is based on the rigour associated with grounding the methods in a context or situation is questioned by Hammersley (1992) since he considers that this implies

"....that there can be no criteria for judging its products" (Hammersley, p.58, 1992)

Although the author would rather agree with Lincoln and Denzin (1994) above and with Richardson (1994) and Lyotard (1984) from the sociology literature and Goguen (1994) from the requirements engineering literature to make the important point that the strengths of postmodernism are firstly the richness to

be gained from exploring the meanings that people in situations share and secondly that it

"....incites us [researchers and analysts] to reflect upon our method and explore new ways of knowing" (Richardson, p.518, 1994)

This is further dealt with in the second of the research questions below in consideration of the rôle of the systems analyst.

What is also important about the revised methodology in this study is that it retains the **essence** of Grounded Theory and ethnomethodology in which **agency** (attention to the means by which actors or organisational members create and recreate organisational structures) is paramount. Furthermore the evaluation of the methodology using the NIMSAD framework suggests that the methodology is more correctly a methodology of problem formulation in requirements determination rather than a methodology to elicit requirements. This subtle change of words adds to the notion of situated requirements rather than formal (captured) requirements since it implies an organisational context rather than a technical context.

2. Can the scope of the rôle of systems analyst be defined in terms of an historical context and in terms of a future context?

    2.1 What is the rôle of information systems methodologies in defining the systems analyst's rôle?

    2.2 To what extent will the rôle of the systems analyst be defined by using methods from the social sciences?

In considering this research question the study has shown through the literature review that the rôle of the systems analyst is much questioned. Indeed, it may be more appropriate to consider rôles of the systems analyst in the plural rather than in the singular, since the plethora of development methodologies and the complexities of situations often demand more than a single rôle. The literature also highlights a rôle for the analyst which moves beyond the traditional notion of expert and indeed beyond the emergent rôle of facilitator. That rôle has

been variously expressed as moral agent (Walsham, 1993a) or reflective practitioner (Schon, 1983) and considered in the problem solving context (Jayaratna, 1994) where the emphasis is not exclusively on technical skill sets or interpersonal skills but on the thinking skills of the analyst, that is, the thinking analyst. Interestingly, this coincides with the view of the researcher as proposed by Lincoln and Denzin (1994) who conclude their foray through qualitative research by trying to assess where the field of qualitative analysis can be said to be situated. They would say the researcher, and in the context of this study the systems analyst, may be considered to be the ultimate 'bricoleur'. But more than simply the jack of all trades, they are also the inventors

"they know they have few tools and little by way of appropriate parts and so become inventors" (Lincoln and Denzin, p.584, 1994)

This is a deeper understanding of the limits of methods and an openness to learning and adaptation. If applied to information systems methods it opens the door for methodology-in-action and the analysis of our experiences and making explicit learning with fellow analysts and sharing also with those who are affected, that is, 'users'. It is the methodological pluralism (Klein et al, 1991) based on reflexivity which is context and the people (agents) in context. This rôle of analyst as bricoleur broadens rather than narrows the scope of action for the systems analyst. It challenges methodological purity in action, where pragmatism rather than dogmatism is at the fore. The bricoleur rôle also avoids the pitfall of treating the selection of methods and indeed methodologies as one might select a tool from a tool box since the rôle incorporates the reflective (thinking) aspect.

In the study the analyst's rôle is defined by the use of methods from the social sciences and the explicit understanding and sharing of the ethnomethodology perspective. However the learning from the action cases show that this is not restrictive in terms of how the methods must be applied. Indeed, the reflective analyst adapts the methodology and makes judgements based on the context. Further to this the analyst actively engages the users through validation to be

part of the methodology and hence shares the problems and ultimately gives ownership of future solutions to the users.

To answer the research question directly, the rôle of the systems analyst can be defined in terms of a move from a historical traditional rôle of systems expert where methodologies were well defined and largely based on the tenets of physical science to a view of analyst as bricoleur in which the use of a methodology is not a constraint but an opportunity. In this study, using methods from social science has helped to highlight this rôle quite starkly. As such, it should help those who claim to use information systems methodologies exactly as prescribed to 'come clean' about how in practice they adopt, adapt and use their thinking skills in action with the methodology being the guide, or template, or legitimisation for development (Fitzgerald, 1996b), rather than its being development itself.

3. Is action case, a research methodology based upon the tenets of action research, appropriate for theory testing in information research in general, and specifically is it appropriate for studying information systems methodologies?

This research question is addressing the appropriate use of action case as a research methodology for investigating the use of information systems methodologies. Chapter four uses two frameworks to establish that action case was a valid research methodology for this study. In the empirical work, the resulting learning, given the level of expertise of the author, provided insight into the use of a methodology in action which would have been missed by more conventional research approaches. Action research, of which action case is a derivative as described in chapter 4, is a powerful research method and is at its most powerful when carried out over a long period of time with a large number of iterations involving intervention in a variety of projects. However, even within the time constraints of a doctoral study the action cases can in themselves provide insights and promote new thinking. Action research is about initially formulating a theory (or framework) according to carefully

considered concepts, models or even a philosophy, and then complementing this with carefully selected methods of intervention. However the primary concern is producing the product or service for the client or sponsor and thereby learning from the doing. What is powerful about this is the learning that takes place in the practical situation and the extent to which reflection about what happened can re-cast the original framework and methodology. One criticism is that the learning is almost exclusively internal to the researcher and what, in more common parlance, may be expressed by the phrases 'you learn by your mistakes' or 'just put it down to experience'. It would be damaging to leave the situation there. It is the *articulation* of the learning that is the power, since that is the means by which one person's practical experiences becomes the shared learning of a community. The learning will have been made possible by the framework and the abstraction from practical matters to reflect on this is critical to action research and to action case.

In the discipline of information systems, action research becomes essential to how, as a community, learning can take place about situations, actions, frameworks and methodologies, since as a maturing discipline, information systems cannot afford the time, or suffer the consequences of the mistakes, that will enable all researchers and practitioners to learn the same lessons on their own. Whilst Checkland (1981) must be acknowledged in a methodically content way for his efforts in introducing action research to the information systems field a great deal more needs to be done particularly in the area of information systems methodologies (Wynekoop and Russo, 1995). It is unfortunate that there is still a good deal of literature (Chatzoglou and Macaulay, 1996) which deals with methodology use by asking the questions 'Do you use a methodology? If so, which one? If not, why not?' and expecting that by turning the statistical handle then out will drop significant answers. Action research demands that researchers and practitioners *articulate* and publish work about methodology use in practice especially since information systems methodologies themselves have the potential to promote learning and to share experiences (Wastell, 1995, Jayaratna, 1994). By such means the community may mature and become less obsessed with 'how many?'

and more concerned with 'why?'. In this study the use of the action case method helped the author provide answers to the 'why?' question.

4. How will the study help to define the boundaries and the unifying nature of information systems as a discipline?

The extent to which this study has helped to define the boundaries of an information systems discipline remains unclear. Whilst the author maintains that the study has built upon existing frameworks in information systems in the problem formulation phase, since it complements the work of Checkland (1981) and Checkland and Scholes (1990) in establishing consensus world views, it may be argued that this is not specifically within an information systems discipline and may be considered to be more associated with a discipline of management which already encompasses sociological principles. There is the additional problem that introducing yet another methodology to the debate widens, rather than narrows, the focus for the discipline. But the author would argue that a methodology such as the GIST methodology is a conduit from the discipline of social science rather than an adoption of social science methods. In such a way it helps to further define the problem formulation aspect of the information systems discipline without falling in to the trap that the quality of the methodology may suffer. However care must always be taken when considering the knowledge that an analyst may have of the reference discipline. Clearly the sociological theories covered in this thesis represent only a part of a sociology discipline which is itself developing. This should focus the attention back to the rôle of practitioners and academics, and particularly the former group, in critically reflecting upon and adapting or updating their methods. There is for the researcher however also the degree of adventure and the associated risks when taking theories from another discipline area. For this thesis it provides for the researcher and for other information systems researchers a rewarding and learning experience.

Further to countering the 'not another methodology' criticism the author would draw a distinction between method and methodology. The former may be

considered to be a prescriptive technique or a tool independent of context but methodology is a vehicle for learning about *situated* methods. That is to say a methodology should enable the methodology user to learn about the affect of constraints such as time and other resources upon the use of methods. This is demonstrated in the action cases in the sense that the first use of the methodology did not have a time constraint and yet the second did. The learning from that helped the author learn more about the use of methods in action and how they needed to be adapted. Therefore one should not count how many published information systems methodologies there are but critically assess their value in enabling learning. The GIST methodology as presented has that feature and as such helps albeit in a small way to unify the information systems discipline.

8.5 Critical Evaluation

In this section consideration is given to what the author has learnt about the methods of the study and the research process.

In terms of the methods a number of important lessons have been learnt. On reflection it is clear that at the beginning of the study the author's understanding of the Grounded Theory methods and the perspective of ethnomethodology was insufficient. Although from the point of view of literature these were fully explicated it is clear that in order to have fully understood them then some practical use of the methods in social science research would have been invaluable. The original premise that in organisational settings social science methods may prove useful in understanding social life is still worthwhile. Where the author erred was to consider that the theoretical justification for the conjunction of methods as methodology would necessarily lead to useful practical guidelines. However this does raise the important point about qualitative research that the onus on the researcher is critical. Certainly with hindsight and a more mature understanding it is clear that the starting point was ambitious for what was intended.

With respect to the methods themselves interesting reflections can be made about Grounded Theory as a set of procedures and ethnomethodology as a paradigm of inquiry.

For the original proponents of Grounded Theory the methods were intended to be a departure from traditional functionalist and structuralist theories which were largely deductive to an inductive approach. Yet whilst Grounded Theory has its roots in the interactionist tradition it may be considered to be positivist given the more recent emphasis (Strauss and Corbin, 1990) on the importance of the criteria that can be applied to validate the research process in terms of 'good science'. During the studies this continued to be a dilemma since although the studies drew on ethnomethodology as providing the epistemological basis of the methods used the procedures themselves - coding, comparing, categorising, saturating - have a positivist feel to them. Indeed it may be said that it was the researcher's personal constructs and skills that helped derive the information rather than the use of the procedures and it is the researcher's perspective that maintained the interpretive style rather than Grounded Theory. In that sense then Grounded Theory may not have been the ideal choice of method for data analysis since it did not help in the structuring of the data. More generally this raises questions for experienced Grounded Theorists. What is it in the Grounded Theory procedures that helps the researcher to abstract a rationale or philosophical perspective? There may be little attention given to how the data was generated or collected. If the data collected has already been structured by the collection process, for example through structured interviews, then no rationale can be abstracted by the use of Grounded Theory. In the studies given in this thesis core categories were used to focus the data collection and to shorten the time taken to analyse. This decision - a departure from ethnomethodology and from Grounded Theory procedures - almost certainly ensured that the subsequent structuring was due to the researcher rather than the method.

There are different kinds of issues raised in the use of ethnomethodology. These are particularly significant in the context of the action cases where the

researcher also acted as a consultant. Although the tension between the consultant and researcher have been discussed earlier the issue has not been raised with respect to the expectations of the clients and the impact on the ethnomethodology perspective. The use of ethnomethodology in the study was restricted to the collection of data using the organisational members' own words. Yet one aspect of ethnomethodology is the anthropological aspect of 'living with the natives' which the studies largely ignored. If this is considered it is clear that that client expectations are critical and a better understanding could have been gained about the rationale for the users behaviour and action. In most social situations people exchange transactions such as payment or deeds and these transactions impact upon members behaviour and also what they say. For the analyst as involved rather than neutral researcher the payment causes a tension. The tension needs to be addressed and the two elements separated. Of course without the financial rewards there would not have been an opportunity to undertake the research. On reflection this lack of attention to the anthropological aspect of ethnomethodology ignored critical issues in the action cases. More generally for researchers and ethnomethodologists it raises questions about whether such a perspective can be used in a paid consultancy. If so then explicit attention must be given to that issue as it may distort analysis - as happened in this thesis.

The other important lessons relate to the author's learning about the research process. The most significant lesson as already alluded to in this section has been the shift from naive researcher to more mature researcher. Although perhaps not unexpected the consequence of this is that issues emerge at the end of the process that should have been addressed during the process - not least among these is the use of methods, as mentioned above, without a full understanding of them or of their conjunction. For social scientists who read this work this may be unsurprising. However for information systems researchers it may serve as a warning before borrowing from other disciplines without a good prior knowledge of the reference discipline.

The thesis began with a conceptual framework which was largely a question of the usefulness of social science research methods in practical information systems analysis. What was important about the research process, and in particular in the selection of an action case research approach, was that the conceptual framework changed. Hence, at the end of the thesis, the question can be rephrased and the emerging issues addressed. The author would claim that the articulation of the learning provides sufficient pointers to a way forward. Indeed Jayaratna's NIMSAD ideas (Jayaratna, 1994) were the result of lessons learnt in practice from action research case studies. In any event it is clear that GIST is not a methodology for reasons given above. However the thesis does point to the usefulness of social science methods in helping practising analysts and researchers re-think the methods that they use and the assumptions they make when entering an organisation. Whilst the author suggests that an ethnomethodological perspective may be useful in some cases, the notion of analyst bricoleur suggests that it is the reflection on the intervention and the resolution of tensions that arise that are more critical than the methods used.

At the end of the thesis the author is convinced of the need to pursue the practitioner/academic or consultant/researcher issues within the discipline of information systems. This can only proceed through the critical evaluation of methodologies, tools, roles and domains and will be obstructed by those who maintain the validity of their single point of view. For the practitioners in particular, the rôles that they adopt are becoming increasingly complex, but it is only through education programmes and reflection in action that these rôles will be understood. The danger here is that the sceptical view is taken, and learning or theory is considered out of touch and simply the domain of academics in their ivory towers. The discipline of information systems is dependent upon the community that creates it through that community's social actions and interactions. It is hoped that the work presented in this thesis can make a contribution and be a modality for such structures. In brief, then, the author believes that the thesis provides a contribution to the discipline of information systems in the following ways:

- by showing that there is a rôle for the systems analyst/developer as a creative, reflective practitioner, or analyst bricoleur, in which the analyst is much more than the jack of all trades but is most importantly a thinker and an evaluator;

- by showing that action case is a useful research methodology for short to mid term research studies of information systems methodologies and the validity of the outcomes will be judged on the coherence and consistency of the account of learning that takes place.

From this contribution it is clear that more work needs to be done. It is proposed that an agenda for future work should relate to the rôle of the analyst. The author would wish to perform ethnographic studies to ascertain how analysts select and evaluate methods and methodologies in practice. For the practitioners in information systems development the author would wish to pursue action learning activities with practitioners to promote reflection on process. More specifically this work can be continued by considering the rôle of the researcher in ethnomethodology and the use of Grounded Theory in future problem formulation action case studies which use the adapted framework as a starting point. This must include for this researcher a better understanding of the methods associated with the social sciences.

The research has progressed staccato like and at times almost haphazardly within what, as presented in the thesis has been a sound guiding framework. Without the research framework no research could have taken place. The author would compare the research process and its development much as the development of the GIST methodology. Indeed many of the same arguments given in the thesis with respect to information systems methodology may equally well apply to the research process. Perhaps this was the hardest aspect of the research. To become involved in the process as both researcher and research topic (the systems analyst). The two rôles may be conceptually different but the fact that it was the same person added real strains on the process. The benefit however is the learning and the richness of the experience.

It is perhaps worth closing this reflection with a quote from Schon (1983), whom the author holds in very high regard, and take comfort in the knowledge that as both researcher and practitioner the author stepped into the swamp!

"In the swampy lowland, messy, confusing problems defy technical solutions. The irony of the situation is that the problems of the high ground tend to be relatively unimportant to individuals or society at large, however great their technical interest may be, while in the swamp lie the problems of greatest human concern." (Schon, 1983)

The final few words will be left to Lyndon Johnson, whose sentiments the author echoes for every level at which this thesis has been presented

"At the desk where I sit, I have learned one great truth. The answer to all our national problems - the answer for all the problems of the world - comes to a single word. That word is 'education'." Lyndon B. Johnson.

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APPENDICES

APPENDICES

In these appendices the data is presented which shows the use of the GIST methodology and is presented by reports from the NUD•IST software package. The first part shows the development of a category, the associated memos and the integration between memos. In the second part attention is given to a completed category and the associated indexing and cross referencing. Given the amount of data collected and transcribed it would be impractical to provide all of the data. What is important is that the reader has an understanding of the process. The data is drawn firstly from the HVP action case and then from the FP UK action case. To provide anonymity for the organisations involved the author has edited some of the data and where this has happened it is indicated by brackets '< >' and emboldened text.

A1 The development of a category using the GIST methodology

The text below is the first transcribed interview with Sandra the Practice Manager at the HVP veterinary practice. In the interview the core categories were asked in addition to clarifying supplementary questions. The output begins with the memo about the document made the same day and additions made as other interviews took place later that week.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: **<HVP>**, User jim hughes.

++
++++++++++++++++++
+++ ON-LINE DOCUMENT: Sandra **<surname>** (SE1)
+++ Document Header:
* interview with Sandra **<surname>**; Practice Manager
* W**<site name>**; 0930; 8 January 1996

+++ Document Memo:
Three main 'seed' areas covered
1. job / role
2. the three sites and communication
3. management / decision making

it is interesting that sandra refers to 'heads' that the vets must have. Need to explore in interviews with vets.

There remains confusion about what she says happens and what actually happens. certainly need to cross reference with vets , nurses and receptionists.

Also she shows some allegience to w<**site name**> as 'we' and g<**site name**> as 'them'. It may be worth exploring.

having done some more interviews may need to explore the metaphor of the management. 'top-down' 'heirarchy' and related expressions. sandra's view of it is quite forcefully expressed here

Sandra seems not to have fully embraced the new practice manager role. This idea of gradually pulling out of the farm office seems to confuse the perception of her role. As Farm office person she has more contact with peter and Iain than with the other vets. Also it may be difficult for staff who have been around for a while to believe she's the practice amanger if she keeps doing the farm things. She should only be the practice manager

+++ Retrieval for this document: 318 units out of 318, = 100%
++ Text units 1-318:
1
2 Q Can you describe your job?
3
4 Practice manager and overseeing the day to day running of the farm
5 office as well its really linking the three sites. I do all the vet rotas
6 so that the staff at each branch know what each vets have got at each
7 given time and which vets are farm vets and various things. I do all
8 that - I link up as well with the phone ladies to see who's going to
9 cover the phones at night. I make sure that every branch then - I try
10 and do all the rotas for six weeks in advance so that everyone can book
11 re-appointments back in because most people want to be seen three to
12 four weeks after when they have been seen. So that's why we try to
13 work ahead like that when we can. I write out what call sheets - you
14 better see these when you go across to the other branches - I don't do
15 it here [W<**site name**>] because they take my day book and they mark it up
16 from my book, but the branches so that they can see at a glance which
17 vet is aware. They have a sheet marking day to day who's consulting
18 at S<**site name**>, who's consulting at G<**site name**> who's out on farm - so
19 if they need to tie up with another vet they can see where abouts they
20 should be and also erm the vets can look up in advance to see what
21 they're doing on Thursday, what they're doing on Tuesday. They
22 know what they're doing normally if no-one's on holiday but things
23 change you see they need to change around and be doing different
24 things possibly different times of the week. If someone's away like

POs a farm vet if he's off then there's other people that fill that role different times of the week so they can look and see PO s on holiday - which day I'm doing farms. So it makes people feel obviously a lot better because they come in each day knowing what they are going to do rather than ring me up in the morning 'what am I doing this morning' you find they cope a lot better if they've got their farm head on or their small animal head on in the morning so try and give them as much information as much as we can and as far in advance as we can.

Q You talk about getting the sheets to the other sites

I send them across to the supervisors?

Q Tell me about that

In what I call the practice mail run. Vets or any staff that are moving between, or I go myself very often a couple of times a week so I'll take it.

Q Where do you go from?

At the moment I'm based a the Farm Office [W<**site name**>] I'm pulling out more and more - we've got another clerk in there now. She just started when you came before - Lisa [<**surname**>]. Em not sure if she'll stay but em trying to gee her up getting her to work harder, getting her a lot more involved so that I can pull out more, I'll probably work up here [upstairs at W<**site name**>] more. My role is such a new role pulling out of the farm office. More picking up the phone and putting the drugs up - that sort of thing is what I'm pulling out from. But the organisation of it I'll still keep involved in. But how exactly that'll pan out we don't really know - we're still at the stage of trying to train up a second clerk [Lisa **surname**>]. All the DAISY which is all the farmers information data on the computer that'll be done by them [Lisa **surname**>, Jo <**surname**>] all the day to day running - picking the phone up, putting the drugs up for the farmers, giving advice, getting in touch with vets but I shall still do the organisation of which vet goes where and we have a lot of meetings on the farm side I shall still get involved with organising those - go along, attend those. We haven't advertised to the farmers that I'm pulling out of the farm office because I've been there for seven years, a lot of them want to stay there I think but er you can't do it all can you?

Q can you do it all?

Yeee yes. But its just changing so much at the moment that its hard to keep on top of all the changes - but yes do and 'm sure I will enjoy it

once we've ironed out all the different areas. At the moment we've got this point that we're aiming at you know and your diversing to solve this problem, solve that - I'm sure we'll get there eventually this year.

Q What is it that you don't enjoy?

Erm talk - I think its having to talk to so many people about every item I think that's my biggest problem. We are ironing out that problem as we go through. From two angles really. We're having a staff meeting at every branch once a month, which I shall go along to and say, at Whetstone we're changing which day we do our eye consults. You're better to talk to a room full of people and be able to tell them and be able to diverse that type of information which gets on everybody's nerves if they don't know it, you know it makes their job harder etc. Erm we find if we put it down on a memo and put it on the notice board it doesn't necessarily work either we've tried that. So we're finding that to actually pick the phone up and tell 30 people its just very very exhausting, very very tiring. So we have a Partners meeting every week so that's getting easier you know I can tell the partners these type of things but I shall go along to all the staff meetings at all the branches. Before any changes that we implemented I found that I've come a cropper because I've given the information to all supervisors and actually said this is what we're going to do, they've all agreed this is a change that we're going to make but its been put through to the staff in a very very negative fashion. 'This is what the bosses say so we're going to have to do it', that type of - can you see what I'm saying...a lot of the supervisors have been here a long time so they don't take to change very very easily. Rather than actually say at the point we're discussing it that they don't agree with it or we're asking them to more of that then we should be divesting them of something else. They nod their head and say yay and off they go but the negative vibes come through when they're diversing information through to the staff. So we're finding it that I'm going to deal with the supervisors when we're doing the change and say 'right this is the time to say if you've got a problem with any of that and what do you think the problems will be' and we sort them out at source then. But if we do agree on it and get it sorted then I'm going to talk to the staff about the changes... I just think its very very important for me to go and say these things cos I've always felt before that it comes across in such a way that I'm always seen as the bad guy. .That can't go on - I'm fed up of walking in to the front door or saying 'I'm coming over this afternoon was there anything you wanted to talk about' and everybody goes 'why are you coming over? Whets wrong?' You know I want to be seen to be going over to help not necessarily just to sort out all the problems. To be seen in a much more positive light rather than just a

trouble shooter I suppose....We're working towards this aim I'm sure we'll get there.

Q How does the practice operate on a three site basis?

I think we've improved at it but we can improve a lot more. Peter and the other Partners have just sorted out local managers for the three sites - all the small animal partners. Gareth as the S <**site name**> manager, Andy at G<**site name**> and Stuart here.They've made them in to a team and they meet once a month to iron out all these problems. Also if I've got any information to diverse down and I can't go myself I do it through the local vet manager which is good. But I think what will improve now will be pre-empting problems because I'm not on site its difficult to look at their appointment book or their ops [operations] book - the local managers have to be better at looking at the book and pre-empting problems for the next day. That's what they're not quite so good at. Pre-empting the problems at an earlier stage rather than shouting at 12 o'clock on a Tuesday we're never going to cope with all this - whereas we might have a vet kicking their heels somewhere, not with such a heavy workload. What we do so either Jo or myself is to ring both the other branches between 8 and 0830 'What is your day like?' 'What problems do you foresee?' that type of thing so we know where to target vets if we get one free. Often its far better done the day before. Hopefully it will be better now we have the local managers.....Its far better done on site anyway - its very difficult when you ring up and they're trying to tell you over the phone. It can look like a full appointment book but their may be a lot of second vaccinations which only take a few minutes and the vet on site can glance down 'that'll be alright you can pop an extra couple in there' If you are on site its much easier managed.

Q How does 'targeting' vets work

It doesn't always go down a bundle - I mean we all know that we have to spread the workload and we have to have vets where the work is. That's something that we pointed out last year.

Q Does it cause problems?

Sometimes. More by atmosphere and attitude. You can sense it rather than anything actually being said. I think sometimes its because they have their farm head on and they think they're a farm vet and there's no more farm work they've done it....rather than keeping a multi head on their shoulders that they could be asked to anything at any point today like I have. At any point I could have to go to any of the branches. They often don't always approach it like that. This is why

as much as I can I pre-warn them. When Peter or Iain phones in in the morning sort of say 'yes I hear what you're saying but can you keep it in mind there's a massive amount of operating across at S<**site name**> and they're going to need someone to go there and help later on this morning' and that helps, I do more of that now.

Q What is your role in the Practice management decision making?

I manage more the day to day running. We decide together how nine vets are going to work , how many nights on call they're going to do and how the night duty will be structured, how they'll take their holidays and that sort of thing and then I'll go away and make sure that works. That's what I do really. So it starts from the top and make sure that information is diversed all the way down. And then when its set up make sure it runs like that day to day.

Q All the way down to where?

With the lay staff - it goes Partners, me, supervisors and the local managers right down to the lay staff. ...Often it doesn't go as high as the Partners depending on what it is , I can sort it and then it goes back down. But what we've discovered is as well is not only management of change get implemented through the supervisors very well - like I was saying before it often goes through in a negative way - we're often finding as well that different things if they affect the whole site One the local manager should know first if it affects all his staff. Secondly if it affects all the branches then its got to be a much higher decision....and then the information again has to go down through the local vet managers on site either from the Partners through them or through me to make sure that they know whets going on in case on site they get a member of staff who wasn't there earlier on - they come in in the afternoon - 'whets this?' and nothing's worse. That's your boss and he doesn't know whets going on so we find its very important to diverse the information through the local vet managers.

Q And some of the vet managers are Partners?

But they're not they have to wear different hats. They don't find it easy but they're getting better at it cos I think they find it makes their life easier. When they're down stairs they are a vet and a local manager so and the local manager is dealing with client numbers - all the day to day coordination of this surgery - things that I can't possibly keep an eye on - that the staff maintain all the high standards of the

practice. I don't know how they're talking to the clients on the telephone - well that here comes under Stuart , all that type of thing to make sure that the standard is high in the nursing theatre cos he's on the spot he can see and he knows what standards he and the clients ought to be getting on that front. I'm not a vet or a nurse I don't know. I can keep up the standard of the building I can keep the infrastructure looking good so its a nice environment for the staff coming to work here and for the clients to come into - all those type of things I can do.

Q How do you relate to vets as managers?

It depends what I want to see them for - during the day I just see them as a vet and local vet manager. But in the afternoon when I'm sorting out vet partnership issues, things to go on the partnership agenda...depends under what title I'm talking to them.

Q Is that for all staff?

They know the kinds of thing they should be talking to the vet manager about. And they know the sorts of things they should be talking to me about.

Q Can you say more about the practice mail run which you mentioned earlier?

It is as effective as what we put into it. Going from here [W<**site name**>] to S<**site name**> is very good but going from G<**site name**> to here [W<**site name**>] its not very good. Because well money mainly - we have to send all the cash has to go through here [W<**site name**>] from here to S<**site name**> erm their [G<**site name**>] safe is in the back room erm they've got nowhere to bring it [cash] out and put it on the side so that they can say to the vet that's coming here at lunchtime - Andy lives just down the road here and passes by here every day 'Andy can you take that' and often he's gone, he's finished what he's doing and he's gone and he hasn't told them he's going or whatever so its very difficult for Andy to keep it uppermost in his mind. We often get frantic phone calls from the girls [Lisa , Pam] in S<**site name**> in Accounts 'We haven't had any money from G<**site name**> now for four days'. That causes a lot of stress. We really ought to get better at that but how I don't know, we've had a lot of very cross phone calls that this must happen but it seems to go ok for a bit and then falls down again.

To be honest from here [W<**site name**>] to there [G<**site name**>] its pretty good because I see the partners and put it [paperwork] in their hand so paperwork isn't so bad. And W<**site name**> to S<**site name**> is pretty good because Peter's in here 99% every day - he works across at S<**site name**> in the evening, but coming from S<**site name**> to here isn't very good. It all goes to G<**site name**> via here because nobody

physically goes from S<**site name**> to G<**site name**>. If there's some urgent piece of equipment that has to be transported between those two [S<**site name**>, G<**site name**>] branches or sometimes cash then someone will be sent.

Q is there anything that you would wish to add?

On the management front as well as the day to day running I do get involved a lot in - I do all the Personnel with Peter,yes I do all that, I get involved with all the staff appraisal at all the branches.Peter and I do S<**site name**> and W<**site name**> and Andy and I look after the G<**site name**> staff on the day to day and on the appraisals. Peter and I oversee all the main personnel over all the branches especially if it is an item which does affect all the branches because all the time you've got to take into account well if you let a member of staff do this here how will it affect the staff at the other branches because they do interlink when you get a nurse on holiday you could get another nurse coming in so its very important that we even now well I think over the years each branch has built up its own sort of little idiosyncrasies - not here at W<**site name**> - but all the other branches, the other two, purely because they didn't interchange or link or anything except with vets. But since 'I've worked t W<**site name**> we've got reception teams and nursing teams. Its very important that we have a uniform approach. That's why its a good thing for local managers if staff approach him about something 'leave it with me' and then they can think about it and talk to either me or Peter to how that operates or how that would affect the other branches. Often a small problem could be a much bigger problem.....if you see it just as a site problem then other nurses at other branches say 'well they get away with that at W<**site name**> they don't have to do that' so really we have to make sure we have a uniform approach.

Q can you tell me more about the uniform approach?

Erm day to day if we have a receptionist off here we'll get one from S<**site name**> cos they've got a bigger team. They've got a lot of part timers across at S<**site name**>. Saturdays...G<**site name**> works on their own and it depends who comes up on the rota as to who works where. We purposely set W<**site name**> the same as S<**site name**> so it wouldn't be a problem. G<**site name**> is run a little different from what I can gather some of the girls who have worked there on a Saturday have had to go up beforehand to see how things work - 90% is the same. The phone system isn't the same as here they've got a Mercury phone whereas we've got a Panasonic both here and across at S<**site name**>. On Sunday we have one receptionist on at S<**site name**> and all 12 receptionists take their turn.

303 ....S<**site name**> was always seen as the almost flagship and G<**site name**> as
304 the poor relation. That was how the G<**site name**> staff saw it but it was
305 never seen like that from S<**site name**> but they always felt they were
306 the poor relation but I think with doing all the alterations at G<**site name**>
307 opening this [W<**site name**>] site and knowing that we're going to do up
308 S<**site name**> to be honest we had the best Christmas party we've ever
309 had. Before you'd walk into the room and it would be segregated but
310 this year it was great - so yeah I think its been a good thing.
311
312 ...That's mainly what my job is - making sure we've got the right
313 calibre of staff, planning day to day, doing all the linking between the
314 three surgeries because I know how it affects each branch so most of
315 the things come through me here erm and infrastructure and dealing
316 with the staff once we've already got them, any personnel issues and
317 overseeing the farm office.
318

This first interview generated a number of categories through open coding. The category that is being followed in this appendix is the Practice Manager's category as a sub-category of communication/informality. Initially the category was given the name 'Sandra <**surname**>'. The memo for this category is given below. As it developed references to other memos and other documents were added. Later this category would give way to a new category 'Practice Manager'. However it is useful at this stage to see how the category developed and how integration with other categories developed.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: <**HVP**>, User jim hughes.

****
****
(1) /Sandra <**surname**>
*** Definition:
this subtree contains all references to Sandra <**surname**>
*** Memo:
This subtree contains all refernces to Sandra <**surname**>, the practice manager. This will include all references to what she believes her job to be and also what others perceive her job to be.

After initial coding there seems to be some doubt in Sandra's mind as to whether her role is entirely as Practice Manager or also as a residual

farm office receptionist and keeper of the day book. This confusion is also present with staff who remember her as farm office receptionist.

In addition there may be some feeling from Sandra that work is doing tasks like the day book and that management is perhaps more intuitive than learned.

the following para taken from document memo 'on-call telephone receptionist (BL1)'

The on-call system and management of the staff within that is very informal, certainly for eg vets wives. It typifies an approach to working which is very 'old Saffron Lane' style - it gets sorted when problems arise. here again is another sandras role conundrum. It seems that maybe she is not strategic and she is rather more reactive than proactive and that her grasp of system is what Pete tells her rather than her own developed idea

i wonder whether sandra commands the respect for her job as practice manager and whether that will only happen when she has a more autonomous position and really gets to grips with all systems. why let Tudor redesign the sheets for example?

The following para is an extract from the document memo 'Sandra **<surname>** (SE2)'

it is clear that here is a conflict of roles mainly because sandra has a psychological ownership of the farm office. noone can do the job as well as she can. it was her baby and shes very good at it. (It is worth considering her comments about farmers wife doing the job with what Jo and Lisa said in their interview - document JWLP1)

The following para is an extract from the document memo for the farm office receptionists - Jo and Lisa

The chain of command is not really known. neither Jo nor Lisa mentioned Stuart as the local site manager. they retain theri allegiance to sandra and pete. Also both describe their job as helping Sandra rather than doing the job themselves. worth linking this to sandras psychological ownership of the farm office.

One thing is puzzling and it is that with such a commitment to the farmm ofice, does it mean that she has less involvement or commitment to other non-farm initiatives such as pet health counselling which is another customer care/marketing initiative.. That may be the danger if she keeps her foot in the farm office door that she doesn't have the overview

I still wonder why she was appointed, since if she is so very competent at customer care with farmers and that this is a part of the business

that needs sensitivity and understanding then why sacrifice that in order to strengthen the practice management. its a bit cart before horse - surely the customers come first.

There may be a new category emerging which has to do with an organisational framework or management structure, since Sandra's role is to establish that and maintain it even though my feeling is (see below) that she doesn't yet fully understand the rationale/philosophy

Sandra's management background is minimal. some supervisory office work and some personnel 'clerk' not 'officer'. This background is day to day and not strategic. She has not been involved in developing startegy or policy.

Sandra's philosophy may be be described as old fashioned she perceives strict heirarchy whereas the other partners do not. The perception of lay staff esp supervisors that she is a barrier is borne out by her own description of her job. She has not yet been able to adopt the philosophy of TQM such as empowerment. She does not see herself as advocate or guide or facilitator but as decision maker. She considers that if she does positive things then it will make a difference - I don't see that happening. cf with nurse supervisors (document LCJPJB1) who seem to have a better handle on the philosophy than sandra - that may be because they are at the sharp end of it..

One saving grace is that the culture of the practice is such that sandras learning will be in an environment where it is accepted and that pete's influence on her may make a difference.

Now there follows extracts from the documents mentioned in the 'Sandra **<surname>** ' category memo which are among those which helped to generate the analyst's comments in the memo. That is to say that when coded they indexed or referenced the 'Sandra **<surname>** 'category. Firstly from document 'on-call telephone receptionist (BL1)' in which the receptionist (who is married to the vet, Peter) talks about the informality of the on-call system and reactive rather than proactive response to problems.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: **<HVP>**, User jim hughes.

++
++++++++++++++++++

+++ ON-LINE DOCUMENT: On-call telephone receptionist (BL1)
+++ Document Header:
* interview with Bronwen **<surname>**
* on-call Phone person for Peter **<surname>**(husband)
* W**<site name>**;

...
...
51 The only thing I was thinking about was the fact that I suppose if
52 they make decisions in work like whos second on call or
53 whetherthey'r going to have second call third call or whatever I
54 assume that Pete would come home and tell me about it.
55 But I don't know who telss anybody else. For example the
56 second on call list that they decided to do for the new assistants,
57 Hilary told me about it Peter didn't so I had to go
58 into the W**<site name>** surgery and ask for the list. Presumably
59 Sandra organises that for the others in the pool, but I
60 don't know. I don't know how it works unless Pete tells
61 me.
62
63 If I can't do a night I'd tell Sandra and she'd organise
64 it, or I ask Peter and he might do it for me if he
65 remembers
...
...

The second reference is to a follow up interview with Sandra in which she confirms her attachment to the farm office and the rôle conflict.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: **<HVP>**, User jim hughes.

++
++++++++++++++++++
+++ ON-LINE DOCUMENT: Sandra **<surname>** (SE2)
+++ Document Header:
* interview with Sandra **<surname>**
* practice manager; farm office receptionist
* **W<site name>**;

+++ Retrieval for this document: 147 units out of 147, = 100%
++ Text units 1-147:
....
....

coming here [Whetstone]. So when we came here [Whetstone] we set up a farm shop where they can come in and I don't know I just seem to have put so much of myself into it. I've taken a lot of coaxing to actually come out of there I think. And its probably an ego trip I suppose. Its a job I enjoy and its a job I feel I do very well so possibly the other two girls [Jo Woodward,

....

....

I do think this full time practice manager hasn't gone down very well, that's my feeling from just a few comments. Especially from the staff who have been here a lot longer than I've been here I think it hasn't gone down very well. You know I've been here 7 years and I'm still seen as the new girl by a lot of them. My feeling is from the comments I've had this last month is they feel that I'm a barrier between them and the partners, because the partners have stepped out of the more day to day management through the team leaders things like nurses rotas. But before, gradually I've been getting involved in it over the last yearbut now its been set out, at the staff meeting on Friday - hey you do not go to a partner about I want to take my holidays at so and so and i've been told I can't, or I need extra nurses for this. Every day problems like that it comes to me, if I feel it needs to go higher then I take it ot the partners after I've done all the background work on it. If not I sort it and push it back down the line. But I feel that supervisors feel that they don't get the partner contact that they would like. But they felt that, when they were dealing with the personnel and getting more involved with their staff which is one of the areas that the partners didn't feel they did well as supervisors or team leaders, they've sort of taken that away from them now that's why I have more full time hours on the practice manager side to help deal with all those sorts of things, stop those problems happening, then I think they feel that has broken that link somehow. I don't know, my feeling is that they feel that they have no access to the partners except through me and I feel there's a little bit of resentment there - I could be wrong because nobody has actually physically said that to me. Well one supervisor has sort of said it to me the others haven't but there's been lots of hints about it. But that'll come I think, i'm hoping that its up to me not to be seen as a trouble shooter or a barrier or anything. I've got to make sure that I relinquish myself more and more from the farm office and get out here and do positive things. That the staff don't see me when I walk through the door as a trouble shooter, but that they say oh there's Sand she's come to help me with so and so - you know that I'm there to help and support them rather than interfering.....you know be much more involved in the positive side.

The third document mentioned in the category memo is the 'farm office receptionists (JWLP1). The document extract below identifies that there was a lack of understanding about who the site manager was (identified by omission) and each saw their rôle as 'helping' Sandra.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: <**HVP**>, User jim hughes.

++
+++ ON-LINE DOCUMENT: Farm office receptionists (JWLP1)
+++ Document Header:
* interview with Jo <**surname**> (J) , Lisa <**surname**> (L)
* Farm Office reception;
* **W<site name>**;

+++ Retrieval for this document: 76 units out of 76, = 100%
++ Text units 1-76:
...
...
4 J: BasicallyHelping to run the farm office, make sure that runs
5 smoothly. Helping Sandra manage vets for surgeries. Do a lot
...
...
47 J: There's channels to go through if you are unhappy - just
48 approach Sandra or Peter or one of th other
49 partners.

Finally to complete the document indexing for the category memo 'Sandra <**surname**>' extracts from an interview held with the nurse team leaders from each of the three sites. This extract shows the degree of understanding of the philosophy of team work communication and empowerment that Peter was trying to instil.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: <**HVP**>, User jim hughes.

++
+++ ON-LINE DOCUMENT: nurse team leaders (LCJPJB1)

+++ Document Header:
* interview with Lucy <**surname**>(L);Jackie <**surname**>(J);Julie <**surname**>(Ju);
* nurse supervisors (team leaders);
* W<**site name**>;

+++ Retrieval for this document: 256 units out of 256, = 100%
++ Text units 1-256:
...
...
223 J: they are the bosses they are the people who employ us
224 L: we see them with a vet head on
225 L: when we do see them as vets its on a very informal basis, its a
226 good working relationship. They [partners] tend to think we
227 manage but its not bringing us in to it enough. I mean we can chat
228 about mundane things but they [partners] are not getting the added
229 value from us because they're missing that. Because they are so
230 busy working we don't get that opportunity to talk to them.
231 J: Also there's other people around
232 L: ..you know that guy on the telly who says its good to talk? I
233 often want to ring them up at night and discuss something, but I
234 don't want to intrude on them at night....Do you think they'd have a
235 time when we could phone them up at night?
236 L:.... and I don't think people read faxes ... I think the whole of the
237 practice should be covered in notice boards and drawing pins.....
238 that's the only way we can pass information on, that's to
239 communicate verbally with as many people as possible and then
240 make sure it goes onto the notice board.
241 Ju: yeah there's just so many people to pass information onto now,
242 the practice is never there on the same day so you have to catch
243 people, cos you suddenly find someone should have known
244 something ages ago and they don't know.

Thus far using the first document it has been possible to show the emergence of the category 'Sandra <**surname**> and how the memo from that category linked to other documents as they were introduced into the analysis. As a category grows then aspects of it may either diminish or increase depending on the impact of comparing existing categories with new data from newly introduced categories. In this instance two subcategories initially were established because the amount of data justified it and these were 'Sandra <**surname**>/my rôle' and 'Sandra <**surname**>/others perception'. The 'Sandra <**surname**>/my rôle' category later divided into two further categories 'Sandra <**surname**>/my

rôle/farm office' and 'Sandra <**surname**>/my rôle/Practice manager'. The memos associated with all four of these new categories are given below.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: <**HVP**>, User jim hughes.

****
****
(1 1) /Sandra <**surname**>/my role
*** Definition:
what does sandra think her job is
*** The siblings of this node are:
(1 2) /Sandra <**surname**>/others perception
*** The children of this node are:
(1 1 1) /Sandra <**surname**>/my role/farm office
(1 1 2) /Sandra <**surname**>/my role/practice manager

*** Memo:
This node contains sandra's references to her own job.
This may prove useful since Sandra's job is key to the effective running
of the practice. need to compare with others perception in node (1 2)

Sandra currently maintains a dual responsibility in the practice. She is still
in the farm office as the receptionist (head?) and also as the practice manager.
In many respects there is some conflict here since there are her peers who are
receptionists but they look to her as their manager also.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: <**HVP**>, User jim hughes.

****
****
(1 2) /Sandra <**surname**>/others perception
*** Definition:
how other staff view Sandra's role
*** The siblings of this node are:
(1 1) /Sandra <**surname**>/my role
*** This node has no children.

*** Memo:
This node contains the references to how others talk about or perceive Sandras
rôle. The managers (vet partners) see her as the practice manager and point

to the work she did in the building of the W<**site name**> site. In particular the logistics and dealing with workmen.

Others see her variuosly as both barrier and support. In the old days they had direct access to partners - now they 'go through' sandra. Might be worth exploring those aspects separately.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: <**HVP**>, User jim hughes.

****
****
(1 1 1) /Sandra <**surname**>/my role/farm office
*** Definition:
Sandras job in the farm office
*** The siblings of this node are:
(1 1 2) /Sandra <**surname**>/my role/practice manager
*** This node has no children.

*** Memo:
This node contains references to sandra's job in the farm office.
This is the part of her job that she will be losing - and yet she has quite strong psychological ties to it.

Sandras links to the farm office are most clear in the SE2 document
She also questions how well the other receptionists will cope when she leaves. Her customer care is ofthe highest order and the practice will lose this when she leaves. Are they aware of this risk?

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: <**HVP**>, User jim hughes.

****
****
(1 1 2) /Sandra <**surname**>/my role/practice manager
*** Definition:
Sandra's job as practice manager
*** The siblings of this node are:
(1 1 1) /Sandra <**surname**>/my role/farm office
*** This node has no children.

*** Memo:
This node relates to sandra's job as practice manager. The role is key to the practice in terms of its smooth running

I think this needs some clarification and may be worth looking at from two aspects - one would be how the day to day tasks are performed and the other would be the menagement tasks. Sandra admits herself that this is not a very strong area.

Below is an example of how one of the nodes is referenced to the documents which help the analyst build the memo for the category. The category chosen is 'Sandra <**surname**>/my role/farm office'

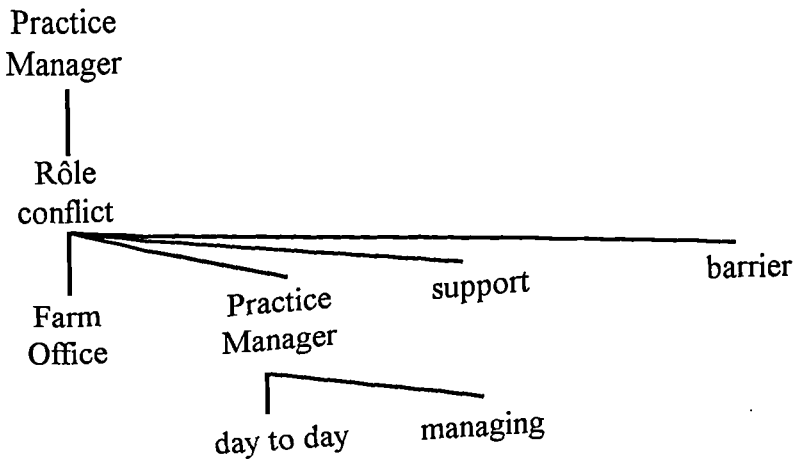
Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: <**HVP**>, User jim hughes.

****
****
(1 1 1) /Sandra <**surname**>/my role/farm office
*** Definition:
Sandras job in the farm office
++
+++ ON-LINE DOCUMENT: Farm office receptionists (JWLP1)
+++ Retrieval for this document: 10 units out of 76, = 13%
++ Units:4-13
++
+++ ON-LINE DOCUMENT: Peter Orpin (PO1)
+++ Retrieval for this document: 7 units out of 267, = 2.6%
++ Units:249-255
++
+++ ON-LINE DOCUMENT: Sandra Edwards (SE1)
+++ Retrieval for this document: 21 units out of 318, = 6.6%
++ Units:46-65 317-317
++
+++ ON-LINE DOCUMENT: Sandra Edwards (SE2)
+++ Retrieval for this document: 59 units out of 147, = 40%
++ Units:5-32 34-64
++
++++++++++++++++++
+++ Total number of text units retrieved = 97
+++ Retrievals in 4 out of 30 documents, = 13%.
+++ The documents with retrievals have a total of 808 text units,
so text units retrieved in these documents = 12%.
+++ All documents have a total of 4215 text units,
so text units found in these documents = 2.3%.
++
++++++++++++++++++

More extensive reporting is possible which will also provide the text in addition to the text numbers. This is considered in appendix A2 below.

When further analysis took place a major category was emerging which was 'Communication' with a subcategory 'communication/informality'. At this time the hierarchy was redesigned to promote some categories and demote others according to their importance determined by the data. Therefore a new subcategory was created under 'communication/informality' this was entitled 'Communication/informality/practice manager' and this took on the properties (memos and indexing) of the former 'Sandra<**surname**>' category. During this revision a category 'rôle conflict' was introduced below the 'Practice Manager' category and the opportunity was taken to split the duties of the Practice Manager into 'day to day' (an in vivo category name) and 'managing'. Also the 'others perception' category was more usefully split into the 'support' rôle and the 'barrier' rôle. The revised structure as given in the main body of the thesis was arrived at. This is given below.



It has been the intention here to show how a category develops and importantly how the analysis is always grounded in the data. It is also important to note that the development of other categories takes place at the same time and hence a text unit in one document may be referenced for a number of different

categories. The use of indexing and cross referencing is given in the next part of the appendix.

A2 Cross referencing and indexing using the GIST methodology

The first report is the coded transcript with the Managing Director. The report takes each text unit (one line) and indicates how it is indexed and cross referenced, that is linked to categories. The links to categories and between categories is shown through the document memo.

Q.S.R. NUD.IST Power version, revision 3.0.4d GUI.
Licensee: Jim Hughes.

PROJECT: FPUK, User jim hughes.

++
++++++++++++++++++
+++ ON-LINE DOCUMENT: Managing Director (CB1)
+++ Document Header:
* interview with Colin **<surname>**
* Managing Director

+++ Document Memo:
This is the first interview with Colin. Interestingly he provides not only the info about his job but also some useful stuff on culture too. Colin is IT literate with a strong IT background, it will be interesting to see if this is reflected in other key staff. On first coding there is some concern over the porting of disks to transfer data and also how the IT in general is managed and by whom.

+++ Retrieval for this document: 102 units out of 102, = 100%
++ Text units 1-102:
1
2 Q Can you tell me about your role?
3
4 I'm the general manager and I suppose I steer the company
(1) /integration
(1 2) /integration/external
(2) /control
(2 1) /control/managed
5 and develop it. Although about 60% of my job still has to do
(1) /integration
(1 2) /integration/external
(2) /control
6 with the main coil design and I get involved in all ofthe major

(1) /integration
(1 2) /integration/external
(2) /control
7 design work. That will change but there's noone here who
(1) /integration
(1 2) /integration/external
(2) /control
8 can do that at present. I also do the design and costing of
(1) /integration
(1 2) /integration/external
(2) /control
9 samples. Another 25% or so is sales and marketing. I
(1) /integration
(1 1 4 3) /integration/internal/stand alone/brochures
(1 2) /integration/external
(1 2 1 2) /integration/external/customer loyalty/sales team
(2) /control
10 prepare he brochures for exhibitions erm I suppose about 15%
(1) /integration
(1 1 4 3) /integration/internal/stand alone/brochures
(1 2) /integration/external
(2) /control
11 is developing and steering the company. For example the
(1) /integration
(1 2) /integration/external
(1 2 1 1 2) /integration/external/customer loyalty/electronic trading/design alliance
(2) /control
(2 1) /control/managed
12 arrangement with germany. I work at home in the evenings
(1) /integration
(1 1 4 3) /integration/internal/stand alone/brochures
(1 2) /integration/external
(1 2 1 1 2) /integration/external/customer loyalty/electronic trading/design alliance
(2) /control
13 and produce the brochures and catalogues there.
(1) /integration
(1 1 4 3) /integration/internal/stand alone/brochures
(1 2) /integration/external
(2) /control
14
15 Really i'm trying to push the managing down to edwina and
(2 1 1) /control/managed/push down work
16 the other managers. Hopefully iso 9000 will enable me to do
(1 1 2) /integration/internal/quality
(2 1 1) /control/managed/push down work
17 some delegation as will new admin staff to release lorna for
(1 1 2) /integration/internal/quality

(2 1 1) /control/managed/push down work
18 sales and so on. I suppose she might even get involved in
19 costing new designs.
20
21 Q how will people respond to delegation?
22
23 Its a questiion of culture I suppose. Its a really nice physical
(3) /culture
24 environment here. Its a philosophy passed on from Svend
(3) /culture
25 [the owner]. He is a real gentleman and a caring person
(3) /culture
26 who's thoughtful about the workforce and this rubbed off
(3) /culture
27 when the company started - in fact perhaps too much at first
(3) /culture
28 (laughs). It was like a holiday camp and that doesn't always
(3) /culture
29 work when you need to get work done. Its been a change
(2 1) /control/managed
(3) /culture
30 from no rules almost until I took over and i've slowly
(2 1) /control/managed
(3) /culture
31 introduced rules and its been ongoing.. the atmosphere's still
(2 1) /control/managed
(3) /culture
32 quite relaxed though, perhaps too relaxed, our productivity is
(3) /culture
33 still less than the danes. But I think we retain the good part of
(3) /culture
34 the caring thing. The workers are the company after all. And
(3) /culture
35 i'd like to keep them all in work.
(3) /culture
36
37 In the offices they tend to be a bit workaholic and they do
(3) /culture
(3 2) /culture/happiness
(3 4) /culture/committment
38 unpaid extra hours. I'd say in general the non shop florr staff
(3) /culture
(3 2) /culture/happiness
(3 4) /culture/committment
39 really are committed and enthusiastic. Really there not well
(3) /culture
(3 2) /culture/happiness
(3 4) /culture/committment
40 paid but they are enthusiastic....we're all on first name terms

(3) /culture
(3 2) /culture/happiness
(3 4) /culture/committment
41 except the old man as we call him, that's Mr Holm who
(3) /culture
(3 2) /culture/happiness
42 started the company.
(3) /culture
(3 2) /culture/happiness
43
44 Q and what is the impact of IT on your work?
45
46 When I think about It affecting my job I suppose I think of it
47 for the whole place as well.
48
49 In the admin office there's SAGE for accounts payroll sales
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
50 and purchase orders stock control and reports. The rporting
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
51 is either daya to day stuff like what we've purchased or its
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
52 management information like cash flow and budgetting. They
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
53 also use EXCEL in there . they take the raw SAGE report to
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
54 produce collated reports such as turnover for one customer.
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
55 They also use EXCEL to collate data on sales order
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
56 processing and other historical data. They use WORD of
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate

57 course. You know contracts of employment, job descriptions,
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
58 letters, faxes, templates. Most of its stored on the network
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
59 and they each have their own area. Legally we have to keep
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
60 some of it hard copy. Oh yes the payroll I mentioned is
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
61 transmitted by fax to the bank. Actually I think we could have
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
62 BACS if we wanted it.
(1 1 3) /integration/internal/shared networks
(1 1 3 1) /integration/internal/shared networks/administrative
63
64 Then there's the engineers. They've got the engineering data
(1 1 3) /integration/internal/shared networks
(1 1 3 2) /integration/internal/shared networks/engineering
65 base on the network in ACCESS.all in linked tables for
(1 1 3) /integration/internal/shared networks
(1 1 3 2) /integration/internal/shared networks/engineering
66 product design, manufacturing information, material specs.
(1 1 3) /integration/internal/shared networks
(1 1 3 2) /integration/internal/shared networks/engineering
67 The drawings aren't on there they're stored as embedded
(1 1 3) /integration/internal/shared networks
(1 1 3 2) /integration/internal/shared networks/engineering
68 objects now.
(1 1 3) /integration/internal/shared networks
(1 1 3 2) /integration/internal/shared networks/engineering
69 Ivan uses ACCESS as well for calibration records and plant
(1 1 3) /integration/internal/shared networks
(1 1 4) /integration/internal/stand alone
(2 2 2) /control/ad hoc/it development
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
70 machinery records. And I'm sure he also uses EXCEL - and
(1 1 3) /integration/internal/shared networks
(1 1 4) /integration/internal/stand alone

(2 2 2) /control/ad hoc/it development
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
71 only he needs that work because he's the production
(1 1 3) /integration/internal/shared networks
(1 1 4) /integration/internal/stand alone
(2 2 2) /control/ad hoc/it development
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
72 technician. David keeps osme of the Quality records I think
(1 1 2) /integration/internal/quality
(1 1 3) /integration/internal/shared networks
(1 1 4) /integration/internal/stand alone
(2 2 2) /control/ad hoc/it development
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
73 its on ACCESS and the quality manual is in WORD 6. I think
(1 1 2) /integration/internal/quality
(1 1 3) /integration/internal/shared networks
(1 1 4) /integration/internal/stand alone
74 they nearly all can use WORD for letters and maybe they store
(1 1 2) /integration/internal/quality
(1 1 3) /integration/internal/shared networks
(1 1 4) /integration/internal/stand alone
75 them on the server.
(1 1 2) /integration/internal/quality
(1 1 3) /integration/internal/shared networks
(1 1 4) /integration/internal/stand alone
76
77 I use the engineering access data base to make updates and ,
(1 1 3 2) /integration/internal/shared networks/engineering
(2 2 2) /control/ad hoc/it development
78 make changes and to refer to for design information. I
(1 1 3 2) /integration/internal/shared networks/engineering
(2 2 2) /control/ad hoc/it development
79 suppose I'm not a heavy user but a regular one.. I've a
(1 1 3 2) /integration/internal/shared networks/engineering
80 confession that I use Framework for wordprocessing but
(1 1 4) /integration/internal/stand alone
81 that's mostly at home. I don't have access tothe admin
(1 1 4) /integration/internal/stand alone
(2 2) /control/ad hoc
(2 2 3) /control/ad hoc/information management
(2 2 3 2) /control/ad hoc/information management/passing disks
82 network so if I need stuff from SAGE or WORD I get it on a
(2 2) /control/ad hoc
(2 2 3) /control/ad hoc/information management
(2 2 3 2) /control/ad hoc/information management/passing disks
83 floppy and I'll get summaries of management reports in hard

(2 2) /control/ad hoc
(2 2 3) /control/ad hoc/information management
(2 2 3 2) /control/ad hoc/information management/passing disks
84 copy eventually anyway. It would be useful sometimes to
(2 2) /control/ad hoc
(2 2 3) /control/ad hoc/information management
(2 2 3 2) /control/ad hoc/information management/passing disks
85 have my own access to SAGE - even though I dont like using
(2 2) /control/ad hoc
(2 2 3) /control/ad hoc/information management
(2 2 3 2) /control/ad hoc/information management/passing disks
(2 2 4 1) /control/ad hoc/network management/decisions
86 it much - because I'm sure it would help in the planning.
(2 2) /control/ad hoc
(2 2 3) /control/ad hoc/information management
(2 2 3 2) /control/ad hoc/information management/passing disks
(2 2 4 1) /control/ad hoc/network management/decisions
87
88 Lets see - I also prepare the documents for exhibitions ,
(1 1 4 3) /integration/internal/stand alone/brochures
(2 2 2) /control/ad hoc/it development
89 catalogues and data sheetsin COREL DRAW which is on the
(1 1 4 3) /integration/internal/stand alone/brochures
(2 2 2) /control/ad hoc/it development
90 network. And I need access to the technical indexes on the
(1 1 4 3) /integration/internal/stand alone/brochures
(2 2 2) /control/ad hoc/it development
91 CD-ROM. I'm sure in time electronic transfer of data sheets
(1 2 1 1 1) /integration/external/customer loyalty/electronic trading/suppliers
(1 2 2 2 1) /integration/external/communication/wished for/interne - email
92 will come using something like the internet but there's not a
(1 2 1 1 1) /integration/external/customer loyalty/electronic trading/suppliers
(1 2 2 2 1) /integration/external/communication/wished for/interne - email
93 lot around at the moment.
(1 2 1 1 1) /integration/external/customer loyalty/electronic trading/suppliers
(1 2 2 2 1) /integration/external/communication/wished for/interne - email
94
95 Oops I've missed Malcolm. He's not on the network at all
(1 1 4 1) /integration/internal/stand alone/health and safety
(1 1 4 2) /integration/internal/stand alone/testing
96 he's got all the health and safety databases which he takes on
(1 1 4 1) /integration/internal/stand alone/health and safety
(1 1 4 2) /integration/internal/stand alone/testing
97 floppy on to his stand alone and he keeps everything else - the
(1 1 4 1) /integration/internal/stand alone/health and safety
(1 1 4 2) /integration/internal/stand alone/testing
98 manuals and so on - on WORD
(1 1 4 1) /integration/internal/stand alone/health and safety
(1 1 4 2) /integration/internal/stand alone/testing

99
100 Obviously we do other bits and bobs but that's the main IT
(2 2) /control/ad hoc
(2 2 3) /control/ad hoc/information management
101 use.
(2 2) /control/ad hoc
(2 2 3) /control/ad hoc/information management
102

In the next report one of the categories indexed above, the 'culture' category, and two of its subcategories will be examined to consider the referencing in more detail. The next report details the 'culture' category to remind the reader of its structure.

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(3) /culture
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
(3 1 1 1) /culture/IT maturity/IT literate/training courses
(3 1 2) /culture/IT maturity/ownership
(3 2) /culture/happiness
(3 3) /culture/team
(3 3 1) /culture/team/peer support
(3 4) /culture/committment
(3 4 1) /culture/committment/extra hours

In the next two reports one category is taken 'culture/IT maturity/IT literate/training courses' and again through the textual references in the memo and the indexing and cross referencing it is possible to see the axial coding that takes place. It is also noteworthy how the memo is used as an interim account which is validated by the study participants. In this case it was presented o the management team.

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****
****
(3 1 1 1) /culture/IT maturity/IT literate/training courses
*** Definition:
This category contains references to training courses in IT related areas
*** This node has no siblings.
*** This node has no children.
*** Documents indexed by this node are:
1: Engineering Assistant (NA1) 2: Manufacturing Resources Manager 3: Technical Manager (DP1)
*** This is 3 documents out of 8, = 38%

*** Memo:
There is no formal IT training programme. That is to say the training which is externally provided is on a needs basis. For those who have attended the courses have been one or at most two day courses in packages.

Many of the staff routinely use the packages and are skilled but show some reticence in saying they are literate in IT.

There is a possible negative side to package only training and this is explored in the ownership category. This node indexes 3 documents.

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****
****
(3 1 1 1) /culture/IT maturity/IT literate/training courses
*** Definition:
This category contains references to training courses in IT related areas
++
+++ ON-LINE DOCUMENT: Engineering Assistant (NA1)
+++ Retrieval for this document: 6 units out of 36, = 17%
++ Text units 11-16:
11 instruction sheets.....There isn't really any formal design as
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
12 suc, I've built it up as I've gone along. I learnt ACCESS
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development

(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
13 from a book first then I went on a few courses to do things
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
14 like advanced queries and form design and programming.
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
15 Really its still all under development. I think the next thing
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
16 we'll look at is security.
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
++
+++ ON-LINE DOCUMENT: Manufacturing Resources Manager
+++ Retrieval for this document: 1 unit out of 25, = 4.0%
++ Text units 12-12:
12 Well I keep all the health and safety policy on WORD and the stuff from COSHH. Its all on WORD - all the risk assessment, the first aid sheets, the health and safety committe meetings. I'm not really that ggod with the computer but I can use WORD now. I mean if it goes wrong I just turn it off and start again. Because it was part of the job I did night school IT and i've done a day on EXCEL and a day on WORD. But if I want any help I'll ask Nick and he's really good.
(1 1 4 1) /integration/internal/stand alone/health and safety
(2 1 2) /control/managed/training courses
(2 2 5) /control/ad hoc/IT support
(2 2 5 1) /control/ad hoc/IT support/peer help
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
(3 1 1 1) /culture/IT maturity/IT literate/training courses
(3 3 1) /culture/team/peer support
++
+++ ON-LINE DOCUMENT: Technical Manager (DP1)
+++ Retrieval for this document: 3 units out of 59, = 5.1%
++ Text units 40-42:
40 but rellay Nick's the draughtsman.. I've been on some
(2 1 2) /control/managed/training courses
(3 1 1 1) /culture/IT maturity/IT literate/training courses
41 courses - 2 days WORD and 2 days EXCEL and I'm

(2 1 2) /control/managed/training courses
(3 1 1 1) /culture/IT maturity/IT literate/training courses
42 struggling along with ACCESS
(2 1 2) /control/managed/training courses
(3 1 1 1) /culture/IT maturity/IT literate/training courses
++
++++++++++++++++++
+++ Total number of text units retrieved = 10
+++ Retrievals in 3 out of 8 documents, = 38%.
+++ The documents with retrievals have a total of 120 text units,
so text units retrieved in these documents = 8.3%.
+++ All documents have a total of 366 text units,
so text units found in these documents = 2.7%.
++
++++++++++++++++++

To further expand on the axial coding (integration across categories) the following two reports are the memo from the 'culture/IT maturity/ownership' category which has been referenced in the 'culture/IT maturity/IT literate/training courses' category above and the indexing for this category.

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****
(3 1 2) /culture/IT maturity/ownership
*** Definition:
This node indexes text which shows how there is some degree of ownership
*** The siblings of this node are:
(3 1 1) /culture/IT maturity/IT literate
*** This node has no children.
*** Documents indexed by this node are:
1: Company Secretary (EK1) 2: Engineering Assistant (NA1) 3: Managing Director (CB2) 4: Production Technician (IK1)
*** This is 4 documents out of 8, = 50%

*** Memo:
There is evidence that for some of the staff there is a degree of resistance to change. It is understandable that change for change sake is not reasonable but long term association with software or hardware may give blinkered views of what is possible. This sounds a bit patronising but it's supposed to beg a question.

Edwina and SAGE

Nick and ACCESS
Colin and framework (to a less extent)
Ivan and Colin to the two workgroup networks

It may be that generally there has been a lack of exposure to other possibilites or that the time or opportunity is never available to explore other possibilities. maybe a lack of a braoder training?

This node indexes 4 documents.

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Licensee: Jim Hughes.

PROJECT: FPUK, User jim hughes.

****
****
(3 1 2) /culture/IT maturity/ownership
*** Definition:
This node indexes text which shows how there is some degree of ownership
++
+++ ON-LINE DOCUMENT: Company Secretary (EK1)
+++ Retrieval for this document: 6 units out of 35, = 17%
++ Text units 20-25:
20 them such as the production schedule. Accounts on SAGE is
(2 2) /control/ad hoc
(2 2 1) /control/ad hoc/innovation
(2 2 2) /control/ad hoc/it development
(3 1) /culture/IT maturity
(3 1 1) /culture/IT maturity/IT literate
(3 1 2) /culture/IT maturity/ownership
21 very goodand I don't really think we'd move to the Windows
(3 1 2) /culture/IT maturity/ownership
22 version I know its more modular but I like what I know and
(3 1 2) /culture/IT maturity/ownership
23 its a big training thing as well. I know Colin hates SAGE but
(3 1 2) /culture/IT maturity/ownership
24 I'm not convinced to change. I mean the job has to be the
(3 1 2) /culture/IT maturity/ownership
25 easiest for the person who is doing it most of the time. I have always used it, I don't think anything else would be as good
(3 1 2) /culture/IT maturity/ownership
++
+++ ON-LINE DOCUMENT: Engineering Assistant (NA1)
+++ Retrieval for this document: 7 units out of 36, = 19%
++ Text units 10-16:
10 So the ACCESS database has diagrams the stock list and the
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 2) /culture/IT maturity/ownership

11 instruction sheets.....There isn't really any formal design as
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
(3 1 2) /culture/IT maturity/ownership
12 suc, I've built it up as I've gone along. I learnt ACCESS
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
(3 1 2) /culture/IT maturity/ownership
13 from a book first then I went on a few courses to do things
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
(3 1 2) /culture/IT maturity/ownership
14 like advanced queries and form design and programming.
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
(3 1 2) /culture/IT maturity/ownership
15 Really its still all under development. I think the next thing
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
(3 1 2) /culture/IT maturity/ownership
16 we'll look at is security.
(2 2) /control/ad hoc
(2 2 2) /control/ad hoc/it development
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(3 1 1 1) /culture/IT maturity/IT literate/training courses
(3 1 2) /culture/IT maturity/ownership
++
+++ ON-LINE DOCUMENT: Managing Director (CB2)
+++ Retrieval for this document: 2 units out of 38, = 5.3%
++ Text units 31-32:
31 Well i'm sure ivan told you the history. Its his babay and mine
(3 1 2) /culture/IT maturity/ownership
32 I suppose. We don't do so badly using the two workgroups
(1) /integration
(1 1 1) /integration/internal/executive is
(2 2 3 2) /control/ad hoc/information management/passing disks
(3 1 2) /culture/IT maturity/ownership
++
+++ ON-LINE DOCUMENT: Production Technician (IK1)

+++ Retrieval for this document: 5 units out of 51, = 9.8%
++ Text units 28-32:
28 Well you have to remember i'm self taught. My background
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(2 2 4) /control/ad hoc/network management
(2 2 4 1) /control/ad hoc/network management/decisions
(3 1 2) /culture/IT maturity/ownership
29 is electronics and programming robots. But I helped set up
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(2 2 4) /control/ad hoc/network management
(2 2 4 1) /control/ad hoc/network management/decisions
(3 1 2) /culture/IT maturity/ownership
30 the two workgroups networks because its more secure for
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(2 2 4) /control/ad hoc/network management
(2 2 4 1) /control/ad hoc/network management/decisions
(3 1 2) /culture/IT maturity/ownership
31 accounts and it keeps the engineering away from accounts. I
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(2 2 4) /control/ad hoc/network management
(2 2 4 1) /control/ad hoc/network management/decisions
(3 1 2) /culture/IT maturity/ownership
32 think its cheaper to stay like this for the time being.
(2 2 2 1) /control/ad hoc/it development/IT evaluation
(2 2 4) /control/ad hoc/network management
(2 2 4 1) /control/ad hoc/network management/decisions
(3 1 2) /culture/IT maturity/ownership
++
+++ Total number of text units retrieved = 20
+++ Retrievals in 4 out of 8 documents, = 50%.
+++ The documents with retrievals have a total of 160 text units,
so text units retrieved in these documents = 12%.
+++ All documents have a total of 366 text units,
so text units found in these documents = 5.5%.
++

It is then possible to see how the interim accounts or memos and the cross referencing eventually become part of the most abstract of the categories 'culture'. The following is taken from the 'culture' account of organisational life given in the thesis.

"...The IT maturity of all staff is encouraged through training courses specific to their work. The consequence is that those staff who formerly had little or no

experience of IT prior to joining the organisation soon become competent users. One negative effect of this competence is the tendency for some staff to have ownership of particular software packages 'I have always used it, I don't think anything else would be as good' which can be limiting when considering wider issues than those which apply to single domains..." (thesis p.163)

It is hoped that this snapshot of the data not only enables the processes associated with the GIST methodology to be understood but also indicates the quantity of data collected and analysed in order to give an account of organisational life which is grounded in the words used by the organisational members.