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The construction of valued skills and expertise within the IT profession: continuing tensions between techies and managers

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THE CONSTRUCTION OF VALUED SKILLS AND EXPERTISE WITHIN THE I.T. PROFESSION: CONTINUING TENSIONS BETWEEN TECHIES AND MANAGERS

by

Annette Knight

Doctoral Thesis

Submitted in partial fulfilment of the requirements
for the award of

Doctor of Philosophy of Loughborough University

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ABSTRACT

The research investigates the expertise, skills and attributes of computer specialists. In particular, it focuses on managers' construction of certain attributes of computer professionals as valuable. In other words it asks "what makes a computer professional valuable?" Although this is of interest in itself, it is also a vehicle for investigating the computing occupation more widely. As the research deals with meaning and sense-making, context is all important. Consequently, the context within which the computing occupation and the skills within it are situated are a major theme throughout.

This study consists of semi-structured interviews with I.T managers and some user and personnel managers. The analysis of the interview data revealed two different organisational types: I.T. companies and I.T. departments. The managers within computer departments and companies constructed value differently and as career and employment environments these organisations appeared to offer different opportunities.

A central finding of the research was that managers use the concepts of technical and managerial to define value within computing. This is a system of meaning in which technical skills are downplayed and devalued in preference to business skills. It is also suggested that it is a system of meaning in which women computer professionals' abilities may be overlooked. Valued computer professionals were found to be hybrids who combine technical and managerial skills and who could cope with the tensions between the organisation and I.T.

At the occupational level it is shown that computing can be viewed as fighting over occupational territory with business professions (Abbott, 1988). Alternatively, this fight might be viewed as a conflict within the occupation between two regimes of knowledge: the technical and managerial regimes (Carter & Scarbrough, 2000a). It might also be framed in terms of a shift from mode1 to mode2 knowledge (Gibbons et al, 1994).

Keywords: computer occupation; professionals; knowledge; expertise; skills; gender; careers; managerialism; organisational professionals.

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TABLE OF CONTENTS

1 INTRODUCTION 9
1.1 PERSONAL REFLECTIONS & ORIGINS OF THE RESEARCH 9
1.2 SCOPE OF THE THESIS & DEFINITIONS 12
1.2.1 Computing & Computer Specialists 12
1.2.2 Occupations & Professions 14
1.2.3 Skills and Individual value 14
1.2.4 Careers 15
1.2.5 The Context or Environment 15
2 LITERATURE REVIEW 18
2.1 THE WIDER EMPLOYMENT CONTEXT AND The I.T. INDUSTRY 18
2.1.1 Changing Economic, Organisational and Labour Patterns 18
2.1.2 The Development of the I.T. Industry 27
2.1.3 Conclusion to Part 1 - Context 32
2.2 THE I.T. OCCUPATION 35
2.2.1 Professionals 35
2.2.2 Scientists and Engineers and the Quasi-Professional 36
2.2.3 The System of Professionals 38
2.2.4 The Computing Profession and its Jurisdiction 39
2.2.5 Knowledge Workers versus Professionals 42
2.2.6 Conclusion to Part 2 – The I.T. Occupation 45
2.3 THE ORGANISATIONAL CONTEXT: the Management of Professionals and Knowledge Workers 47
2.3.1 Autonomous & Heteronomous Professionals 47
2.3.2 Tensions between Organisations & Professionals 48
2.3.3 I.T.-Organisational Conflict 54
2.3.4 Managing tensions between I.T. and the Organisation 56
2.3.5 Knowledge and Professional Networks 59
2.3.6 How Universal are these Tensions? 61
2.3.7 Conclusion to Part 3 – The Organisational Context 64
2.4 SKILLS & ATTRIBUTES 68
2.4.1 Skills shortages & Recruitment Difficulties 68
2.4.2 Computing Culture and the Stereotypical Computer Person 69
2.4.3 Profile of Computer Professionals 70
2.4.4 Gender 73
2.4.5 Computing Education 76
2.4.6 Computing Skills and Expertise 78

2.4.7 Hybrids - Valuable I.T. People? 80
2.4.8 Changes to Computing Expertise 84
2.4.9 Conclusion to Part 4 – Skills and Attributes 88
2.5 CAREERS 92
2.5.1 The Subjective and Objective career 92
2.5.2 Boundaryless careers 94
2.5.3 Career Anchors 98
2.5.4 Technical vs. Managerial Careers 100
2.5.5 Conclusion to Part 5 – Careers 104
2.6 Conclusion to Literature Review 106
3 METHODOLOGY 112
3.1 A Qualitative Approach 112
3.2 Individual and Context (Ontology) 113
3.3 The Researcher, the Researched and Research (Epistemology) 114
3.4 Research Design 116
3.4.1 Research Questions 116
3.4.2 Research Method 116
3.4.3 Data Analysis 128
3.4.4 The Assessment of Research 130
4 ANALYSIS 133
4.1 ORGANISATIONAL ENVIRONMENTS 133
4.1.1 I.T. Departments 134
4.1.2 I.T. Companies 140
4.1.3 Summary & Conclusions 146
4.2 THE CONSTRUCTION OF VALUED SKILLS & ATTRIBUTES 149
4.2.1 Introduction: Ways of Knowing, Managerialist vs. Technologist 149
4.2.2 The Value of Technical Skills 150
4.2.3 The Narrow Techie Introvert vs. the Broad Business Extrovert 154
4.2.4 Interpersonal Skills and the Gendering of Individual Value 156
4.2.5 The Value of Hybrids – Who they are and What they do 161
4.2.6 Doing and Achieving 164
4.2.7 Flexibility and Adaptability 168
4.2.8 Commitment and Stability 171
4.2.9 Summary & Conclusion 176
4.3 THE DEVELOPEMENT OF A VALUABLE I.T. PERSON 183
4.3.1 Getting Started on an I.T. Career - Someone with Potential 184
4.3.2 Exploration: Entering the "real" world 186

4.3.3 Being a Techie: Establishing Yourself 189
4.3.4 Using your Experience: Hybrid or Guru 191
4.3.5 Management 193
4.3.6 Summary & Conclusion 198
5 DISCUSSION 201
5.1 Introduction 201
5.2 Women And Their Value Within Computing 203
5.3 The Development of Individual Value: Bounded or Boundaryless? 205
5.3.1 Comparison of This with Other Career Stage Theories 205
5.3.2 Individual Value and Boundaryless Careers 207
5.4 Organisational Environments & Individual value 209
5.4.1 I.T. Departments 209
5.4.2 The Medium and Large I.T. Companies 211
5.5 Abbott's System of Professionals 212
5.6 Carter & Scarbrough's Regimes of Knowledge 217
5.7 Gibbons et al's Mode 1 and Mode 2 Knowledge 219
6 CONCLUSION: CONTRIBUTIONS REFLECTIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH 224
6.1 Contributions 224
6.2 Reflections on the Research Process 233
6.2.1 The Research Process and What I would do Differently 233
6.2.2 My Values and their Effect on the Research Process and Research Outcomes 235
6.3 Limitations and Suggestions for Further Research 237
7 REFERENCES 239

LIST OF FIGURES

Figure 1-1: Model of the Environment after Bronfenbrenner (1977) 16
Figure 2-1: The Environment of an I.T. Professional 27
Figure 2-2: Changes to the I.T. industry 1960 - 2000 32
Figure 2-3: Holland's personality types of computer operators (ICR) & programmers (IRE) 71
Figure 2-4: Percentage of women in computing 74
Figure 2-5: Competencies of Hybrid Managers 82
Figure 2-6: Personal characteristics of Hybrids 82
Figure 2-7: Abbott's Professional Activities 87
Figure 3-1: Research Questions 116
Figure 3-2: Why I.T. Managers 118
Figure 3-3: Data Analysis & Theory Development in Interpretive Phenomenology (Morse, 1994) 128
Figure 3-4: Data collection 132
Figure 3-5: Interpretation of the data 132
Figure 4-1: Categories of Skills 150
Figure 4-2: Phases to a Valued I.T. Career 184

LIST OF TABLES

Table 2-1: Functional Definition of Professionals 36
Table 2-2: Relative Professionalism of Scientists and Engineers 37
Table 2-3: What computer professionals want from their work 72
Table 2-4: Conceptions of the Computing Profession 86
Table 2-5: Schein's (1993) Career Anchors 98
Table 2-6: Dalton's model of technical careers 102
Table 3-1: The Managers Interviewed (Departments) 120
Table 3-2: The Managers Interviewed (Companies) 121
Table 3-3: Interview themes 125
Table 4-1: Contrasts between the main features of I.T. Departments and I.T. Companies as work environments 146
Table 4-2: Dichotomies identified in the literature from section 2 149
Table 4-3 – Differences in Valued Skills between I.T. Companies and Departments 179
Table 4-4: Comparison of the valued skills of hybrids, techies and women.. 182
Table 4-5: Career Phases of a Valuable I.T. Person 198
Table 5-1: Comparison of Different Career "Stage" Theories 206
Table 5-2: Contrasts between mode1 and mode2 knowledge production (Gibbons et al. 1994) 220

1 INTRODUCTION

1.1 PERSONAL REFLECTIONS & ORIGINS OF THE RESEARCH

This research, in true phenomenological style, comes from my own experience working as a computer professional. Before launching into the literature review it therefore seems appropriate to briefly digress with reflections on my own career to show how the study originated.

I left school after taking A levels in 1982. I had a clerical job for a year and then became unemployed. At the time, there was a lot of talk of computing skills shortages and the increasing need for people with such skills. I therefore decided to enrol on a computing course hoping that this would be an area where I could find interesting work. I was worried that by the time I finished the two-year course there would no longer be a skills shortage and I would be unemployed again. However, just over 15 years later, there is still as much, if not more talk of shortages of skilled computer professionals, even if the skills in short supply are different.

Even after my course, I still didn't find it easy to find a job and had a very narrow view of what jobs there were – it seemed that you either became a computer programmer or an operator. Despite the course, I didn't feel that I knew much about computers and certainly didn't feel I should be let loose programming them. That left computer operator but being an operator seemed a lower level job than programmer. I fancied being a systems analyst but that seemed to involve first being a programmer! Given this apparent lack of suitable jobs and the difficulties and frustrations that I had faced adapting to this technical world with its new language and rules, I opted out of computing altogether and became a post office counter clerk. I soon decided that computing wasn't so bad after all and got a job as a "computer assistant" within a computer department in a hospital. This job wasn't actually on my career map of potential jobs and turned out to be very suitable.

Being a computer assistant involved user support work as did all my subsequent jobs to a greater or lesser extent. Given my own difficulties coming to grips with computers it seemed worthwhile to try to make life easier for others. However, user support did mean being in this middle ground between technical people and non-technical people; a perfect position for observing both whilst not feeling quite part of either. It was also a thankless task as users often seemed an annoyance and disturbance to my computing colleagues and the users themselves were constantly

irritated and frustrated by the systems and had an unending stream of problems and complaints.

When I started my first computing job I'd expected to be trained and directed. Instead, I was pretty much left to my own devices as indeed I was with every other job. I also noticed that others straight from University seemed somewhat at a loss to know what to do and how to do things. More experienced people criticised computing education courses for not teaching anything useful and seemed quite pleased to see newcomers' confusion when entering the 'real' world of work. My jobs never seemed to have a very well-defined role. Equally, it was often hard to discover what colleagues actually did or were responsible for doing.

Working in user support – and later in training – I got the message that I wasn't really technical enough to be a "real" computer person so I set about making myself more technical by getting more involved with hardware and networking and even some programming. However, I don't think I ever quite made it. I never really understood the fascination and interest that some colleagues had with computers and the enjoyment that they got from 'playing' with them. There were others who also seemed to feel the same way and some who tried to bluff their way through technical conversations, bandying terminology inappropriately as they went. As a woman in computing I never felt that it was a particularly sexist occupation, although it was masculine. I did feel that I didn't fit.

At the start of my career, there seemed a lot I didn't know and a lot to learn. It was difficult to decide what direction to take in order to learn all these new things and hard to choose which ones to give priority. This was particularly so given the quick succession of technological changes within computing. As time went on I became less concerned about what I didn't know. On the contrary, I often felt that rather than learning anything new, I was relearning what I had already known but didn't know anymore because things had changed slightly. As for career progression, after 10 years of trying different things, I didn't feel there was anywhere else for me to go, just more of the same. I had thought that eventually I would get a "real" job but came to the conclusion that the jobs that I had held would now have to be counted as real. The alternative was to admit that I'd been messing about trying different things for the past decade. I had expected to get somewhere but never seemed to arrive and realised that not only had I not arrived but also I no longer seemed to be on my way to anywhere that I might want to go.

Following colleagues' careers, they often seemed to face similar dilemmas. Even though perhaps some had started out more content than I, there seemed a lot of positioning and repositioning going on to ensure that people were working in the "right" area, on the "right" technology and had the "right" skills. Throughout my career I felt that there were systems of meanings about which jobs, roles and technologies were "better" than others. These systems were not fixed, but rather were constantly being contested and created. I also met a wide variety of people with different talents, some seemed to "get on," while others didn't.

During my time as a computer professional I became increasingly interested in understanding the careers world(s) that those around me were operating within, the differential value placed on various areas and routes within that world, and the dynamics and meanings involved in creating that differential value. This thesis investigates these areas.

1.2 SCOPE OF THE THESIS & DEFINITIONS

This thesis therefore investigates the skills and attributes of computer staff that are valued. It does not aim to give a list of skills that are valued, definitive or otherwise. Rather it aims to investigate perceptions people (i.e. managers – see section 1.2.3) have of computer professionals and their skills and attributes, and looks at how certain skills and attributes are constructed as more valued than others and the justification for this. Value as used here is not about who is paid more or who is promoted. Rather the study is exploratory and investigates the construction of certain skills and attributes as valuable with the occupation. It is therefore about the construction of meaning and sense-making. The literature reviewed, the interviews with managers, their analysis and discussion are all part of this ongoing exploration. Although the value attached to certain skills and attributes of computer professionals are of interest in themselves they are also a vehicle for investigating the wider codification of the computer occupation. Context is of necessity central to this study in that the construction of meaning and sense-making assumes a context within which, and by which, meaning is shaped and defined.

Below the core concepts used throughout this thesis are briefly discussed, their contested nature acknowledged and their definition for the purpose of this thesis given.

1.2.1 Computing & Computer Specialists

It seems appropriate to begin by asking and defining what is meant and what I mean by computing and computer specialists. It was therefore convenient to find Dijkstra (1989) asking and answering the question, "what is computing?" He explains: "well when all is said and done, the only thing that computers can do for us is to manipulate symbols and produce results of such manipulations". Computing is "concerned with the interplay between mechanised and human symbol manipulation usually referred to as "computing" and "programming" respectively" (p1401).

Although possibly true, this is a rather reductionist description which many would not see as valuable. It does however illustrate one pervasive, very technocentric way of thinking about computing and the work of computer people. For me, computing is a very general term that can be used to describe a variety of different companies, jobs and skills. Other terms, such as I.T., could be used in its place to mean much the same thing. My thesis takes as its area of interest the computing or I.T. occupation, the skills within that occupation and the way those skills are expected to develop over

time. No distinction is made between computing and I.T. and both are used as general terms that appear to be more modern equivalents of "data processing." Computing or I.T. might also include Information Systems (IS) or Management Information Systems (MIS) professionals.

As Connors and Pearson (1986, 1988) noted in their government report on I.T. skills, the lack of any common occupational structure within the information technology industry and the blurring of job boundaries make distinguishing I.T. professionals from those in other occupations difficult. Nevertheless, they provide the following definition:

"The term 'professional I.T. staff' is used in this report to describe people in jobs at graduate level or equivalent whose main activity is associated with the development or application of I.T. It covers electronics, data processing, telecommunications and control instrument engineering" (p13, Connors, Buchan & Pearson, 1988)

In keeping with this definition I'm taking the I.T. industry to encompass organisations that provide computer software or hardware products or computer services and that are therefore involved in developing or applying I.T. However, I take a narrower view. Unlike Connors and Pearson, here a distinction is drawn between computing professionals and electronic (or microelectronic) engineers. Thus any person who is more involved with developing the electronic components that form part of a computer is not of interest. Also those more involved in communication technologies more broadly, rather then networking computers, are not of interest. I am interested in those who work in mainstream, commercial computing jobs, thus those who work in specialised leading edge research jobs e.g. artificial intelligence or virtual reality research, are also not of interest. The sorts of people who are of interest might be involved in software development such as analysts, programmers, software engineers, developers or designers. Also of interest are project managers, computer consultants, user support and help desk people, computer trainers, network and hardware support and development people and those involved in systems integration. These include both graduates and non-graduates although the roles can be considered to be of a graduate level. I include people who work in I.T. companies and those who work within user organisations to support the organisation's use of I.T. This definition is similar to that of Caine et al (2000) who list the following five occupational groups as of most relevance to the information and computing technology industry: I.T. managers; software engineers; analysts and programmers; computer engineers and computer operatives.

1.2.2 Occupations & Professions

Occupations and professions are types of work-groups that link certain groups with particular areas of expertise and particular tasks (Abbott, 1988). They enable the "pursuit of collective economic interests" (p336, Tolbert, 1996) and confer status, power and control of certain tasks and areas of knowledge on group members (Fincham, 2000).

Abbott (1988) and others (Barley & Tolbert 1991) use the term profession very loosely ignoring the issue of exact legitimation of particular occupations to the title. Likewise, whilst recognising that the term professional is contested when applied to computer workers, for the sake of simplicity and readability, the term profession and professional are applied to computing and computing personnel and, like Abbott, the argument of whether this is an appropriate label is left. Abbott's definition of professions as "exclusive occupational groups applying somewhat abstract knowledge to particular cases" (p8) is therefore good enough here as this thesis does not rest on whether or not computing workers are or are not professionals in any stricter sense. However, the literature on professionals can be used to explore what might be considered "valuable" amongst computer people. Occupations and the concept of professionalism are explored further in section 2.2 of the literature review.

1.2.3 Skills and Individual value

These terms are used throughout the thesis to signify the expertise and competencies of individual employees. They are also meant to imply any other attributes, such as attitudes, beliefs etc, that make an individual valuable within the context of their employment; they are, in other words, a short hand way of saying anything about an individual employee that might be considered valuable. They are therefore very broad and all encompassing definitions. Similar terms such as intellectual or human capital (Kanter, 1993) and competencies (Prahalad & Hamel, 1990) are not used, because they are related to human resources management and imply a perspective that helps organisations to understand and get the most out of their employees. The position taken by this thesis is wider and aimed at gaining an understanding of the way certain skills and attributes of individuals become defined as valuable within the I.T. occupation. Obviously, the organisation plays an important part in creating this definition of value and its role is explored in section 2.3 of the literature review. Section 2.4 of the literature review looks specifically at the skills and attributes of computing professionals.

The question remains however, as to whose perspective might represent that of the occupation when asking what is valued within I.T. As the I.T. occupation is organisationally based, many of those with an opinion and influence on definitions of value are managers within organisations. I therefore decided to interview a number of I.T. managers from different organisations and also to include other managers who might be concerned with the skills of computing personnel, for instance personnel and user managers. These people have a stake in the social construction of individual value within computing – obviously, everyone with a career in computing has a stake, as possibly do those in other occupations, however managers and I.T. managers in particular have an interest in I.T. skills in more than just a personal sense. They are also in positions where they have some power and influence to define what is valued and have roles that of necessity involve them thinking about people and their value.

1.2.4 Careers

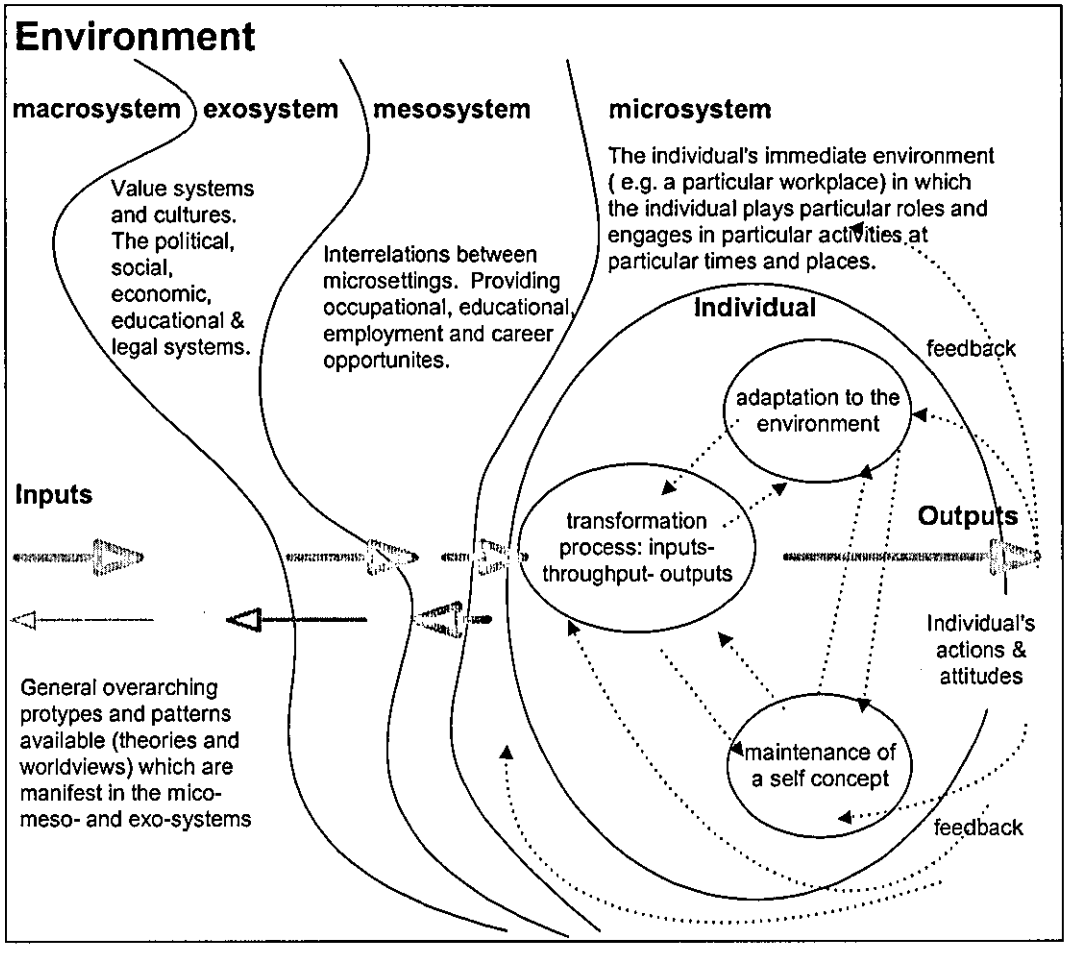
A much-quoted definition of career is "the evolving sequence of a person's work experiences over time" (Arthur, Hall & Lawrence, 1989, p8). This "sequence" is said to be patterned by some containing social structure that until recently was assumed to be an organisation, but could also be an occupation. These "experiences" include the roles and behaviours that people perform, and the attitudes and relationships that they form. As Dalton (1989) mentions, the word career derives from the French word "carriere," meaning road or racecourse. In English the word has come to mean "to move or run rapidly" or "progress through life: (advancement in) profession or occupation" (Chambers English Dictionary). Thus the word "career" is also associated with the notion of development and progress along some path or course. It is associated with a meritocratic society in which individual status can be achieved by effort, education and work (Collin & Young, 2000). Progress, advancement and increases in individual value are therefore inherent in the notion of careers. Careers are considered normal and desirable. They are used to differentiate between employees, and to persuade and generate motivation, effort and commitment from them (Collin & Young, 2000). They arise from the interaction of individuals with organisations, occupations and society (Collin, 1998).

1.2.5 The Context or Environment

Figure 1-1, adapted from Bronfenbrenner (1977) and Collins (1990), shows a systems model of the individual and their interaction with the environment. It shows how input from the environment influences the individual's attitudes and actions and how these in turn produce feedback for the individual about their environment and affect that

environment. Although in the model the individual only directly interacts with the micro part of the environment, they are influenced by (and in turn can influence) larger systems. For example, a programmer working for ABC Computers will be influenced by the I.T. occupation and the I.T. industry as well as the overall employment context and economic situation. More widely, they will be influenced by the worldviews that are available and which inform the culture and political situation in which they work. This thesis in interested in the I.T. occupation, which appears at the meso-system level of the diagram.

Figure 1-1: Model of the Environment after Bronfenbrenner (1977)



The occupation is thus the main focus of this thesis but the context of the occupation is all important and is considered in section 2.1 of the literature review. Just as an occupation needs to be placed in context, skills, competencies, expertise etc all imply a context (e.g. an occupation or organisation) in which that expertise is applied, and when applied is recognised and interpreted as expertise and is assessed as more or less valuable. The subject of this thesis is therefore the differential value and status ascribed to different skills and roles within the I.T. occupation by a number of managers. It may not just be a case of having the appropriate skills or combination of

skills for the context, it may also be about following the right social processes and structures (e.g. organisations and careers) to create / acquire those skills.

The rest of this thesis uses and expands on the terms defined above to explore the computing occupation and the construction of individual value within the occupation.

2 LITERATURE REVIEW

This literature review begins by setting the scene. It delineates the wider context within which the I.T. occupation and the skills within it are located. It also briefly describes the history of the I.T. Industry and outlines changes to the industry, which in turn have affected the value of different skills. Secondly, it locates the I.T. occupation within the wider groupings of professions and knowledge work. Thirdly, it looks at the organisational context with which computer work takes place; specifically the literature on organisational professionals and the seeming conflicts that exists for them between membership of their organisation and their occupation. Fourthly, the literature review gives an overview of research into I.T. professionals themselves: their skills and attributes and what kind of people they are or at least the way that they are perceived to be and are presented. In particular, it investigates what are perceived to be the valued (or potentially valued) skills and attributes of computer professionals. Skills within the world of work, and particularly the I.T. occupation, are by their nature dynamic and developmental. Lastly, therefore, this review looks at the careers literature for ideas about the development of occupational skills and attributes within I.T.

2.1 THE WIDER EMPLOYMENT CONTEXT AND THE I.T. INDUSTRY

The position taken by this thesis is that meaning is not just to be found in the object of interest but also derives from the context within which that object is situated. It is therefore impossible to study computing as an occupation and the skills and careers within it without also looking at the industry to which that occupation is tied and also the wider employment situation in which the occupation and industry are located.

This section sets the scene by firstly reviewing the current interest in the literature about changing employment patterns and employment relations in Britain and secondly reviewing the development of the computing industry. Obviously to try to delineate a context is rather like trying to reach the end of the rainbow, never ending and ultimately impossible. The aim here is thus to briefly outline what seem to be the main features of "the environment" or context for the computing occupation.

2.1.1 Changing Economic, Organisational and Labour Patterns

Economic

It seems that radical transformations have occurred in the British as well as other Western economies (Jackson et al, 1996). These transformations are often linked to

the rise of global competition and the consequent greater emphasis on product and service quality. Globalisation, it is argued, leads to an economic environment that is less predictable and less stable. Consequently, speed in responding to markets and customers and the flexibility necessary to do so become central to business success (Thompson & Warhurst, 1998; Lawler, 1994). Technological developments are another major factor often associated with these changes; they have enabled work tasks to be automated; they have accelerated the pace and extent of change as well as created new kinds of organisations, occupations and jobs (Thompson & Warhurst, 1998; Jackson et al, 1996). Also I.T. helps to place information and its management at the centre of organisational performance (Palmer, 1990).

Closely related to globalisation is the reaffirmation of the liberal doctrine of free market capitalism and the related emphasis placed on the importance of business. Recent British governments have supported market freedom (Hutton, 1997; Exworthy & Halford, 1999; Wilks 2000). The "natural" workings of the market have been seen as the best way of ensuring an efficient and effective allocation of resources and a healthy economy. Likewise recent changes to regulatory and tax regimes in Britain have favoured the business corporation and the autonomy and the freedom of business have also been protected (Wilks, 2000). As Thompson & Warhurst (1998) remark, the rise in the importance of business can be seen by the fact that business and management courses now have the largest student enrolments in British higher education. Also business doctrines have been extended into the public sector with state ownership relinquished in favour of privatised services. In addition business people are increasingly taking on leadership roles in other sectors (Wilks, 2000; Thompson & Warhurst, 1998) resulting in the primacy of business and market values within traditionally very non-business-type areas, e.g. health and education (Hutton, 1997).

This free market ideology is concerned with the freedom to buy and sell. It spawns the notion of contract capitalism in which the economy can be viewed as a network of contracts between buyers and sellers mediated by price. Customers become central in such a system and efficiency and flexibility are seen to lie in permanently re-negotiable contracts. Consequently, labour, like other commodities, can now be bought in the quantity and duration required (Hutton, 1997).

Organisational

Whereas once researchers were fascinated by large organisations, in the mid-80s this began to change (Arthur 1994) as large conglomerates were broken up and old

bureaucratic-style structures gave way to flatter, network type structures (Mabey, Salaman & Storey, 1998). The coordinative function of middle management no longer seemed to be needed; decision-making could be devolved and organisations de-layered making them flexible and responsive (Thompson & Warhurst, 1998). Larger organisations were downsized in the name of leanness, efficiency and competitiveness (Mabey et al 1998; Jackson et al, 1996; Kanter, 1993). Kanter (1993) describes this emphasis on leanness as the "Silicon Valley model" (p303) in which companies such as Apple and Sun pride themselves on being able to stretch themselves to do more without increasing the workforce. Also smaller specialist companies emerged (Jackson et al 1996).

The rise in the global economy forces organisations to look outward and acknowledge their interdependence (Kanter, 1993). It is claimed that organisations have restructured both their internal and external relations and become more boundaryless. Their external boundaries - between the organisation, suppliers and customers – appear to have become less rigid, incorporating for example joint ventures, strategic alliances and outsourcing arrangements (Mabey et al, 1998). Burrell (1996) and Kanter (1993) argue that with increased market orientation economic success is no longer about producing products but depends on looking outside the organisation for ways to serve and meet the unique needs of customers. Internally both vertical and horizontal barriers seem to have been breached with for instance cross-functional teams and the creation of internal markets (Mabey et al 1998).

New organisational structures appear to be taking the place of traditional bureaucracy. Large organisations have been restructured and re-engineered to become focused on identifying and developing their core competencies (Mabey et al, 1998; Jackson et al, 1996). Non-essential functions have been outsourced and short-terms contracts, once reserved for routine work, have also become prevalent for professionals (Watts et al, 1992; Kanter, 1993). It is claimed that organisations have become learning or knowledge centred whereby they emphasise the primacy of knowledge, learning and intellectual capital. Speed, responsiveness and flexibility are emphasised hence the creation of short-term, cross-functional project teams (Mabey et al, 1998; Kanter, 1993; Jackson et al 1996). Organisational hierarchies are said to be giving way as organisations become webs or networks (Reich, 1993). With flatter more horizontal organisations, traditional hierarchical management practices are also challenged. Formal power may no longer be so much derived from hierarchy as from professional expertise (Kanter, 1993).

Organisational adaptability, the ability of the organisation to learn and change, is perceived to be heavily dependent on the organisation's employees, as are the provision of services. Employees thus become crucial to organisational performance. According to this view jobs and job descriptions become relegated to the industrial, mass production economy where bureaucratic structures are rationalised, work standardised and efficiency increased by Tayloristic techniques (Lawler, 1994). The Tayloristic division of labour between thinking and doing and the rigidities of Fordist production methods, seem to imply a fixed world (Thompson & Warhurst, 1998). In contrast, people today are valued as resources who have certain competencies, who add value by using those competencies and learn new competencies as the need arises. There appears to be an increase in both the amount and kind of value that people are expected to add (Lawler, 1994). Core employees have therefore been touted as the organisations most valued resource, they are said to provide competitive advantage and efforts are thus made to release their full potential (Watts et al 1992; Jackson et al 1996). Finally there has been an increased emphasis on performance management for both employees and business units.

Labour Patterns and Changes to Skills and Careers

In connection with the wider economic and organisational changes mentioned above, the composition of the labour force is also altering. The rise of the global economy has been accompanied by cycles of economic boom and bust, which have led to periods of high unemployment and widespread feelings of job insecurity. Similarly, increased competitive pressure requires greater productivity, which is often achieved at the expense of people's jobs (Hutton, 1997). In addition, there has been a shift away from the manufacturing and extractive industries to coordinative and service industries, which has led to certain skills becoming obsolete (Thompson & Warhurst, 1998; Jackson et al, 1996). Work no longer appears to be concerned with the production of tangible goods but with knowledge and the manipulation of symbols (Thompson & Warhurst, 1998). The global economy has also meant the globalisation of labour markets with production jobs and increasingly higher skilled jobs moving to lower wage countries (e.g. programming to India).

The rise in service industries has meant an expansion of new technical, managerial and professional jobs (Thompson & Warhurst, 1998; Jackson et al. 1996). However, this is not just due to new jobs; abstract thinking seems to have become part of existing jobs that previously relied on tacit knowledge. Educational qualifications are beginning to focus on skills and competencies i.e. on what people can actually do. As a result, there is an increase in the range of educational credentials people can attain

(Thompson & Warhurst, 1998). It seems that the UK now has a better-trained and better-educated workforce than ever before (Jackson et al. 1996). Management it is suggested is extending the skill requirements for jobs to include knowledge, intellect and attitudes and consequently is seeking ways to measure and regulate such abilities (Mabey et al 1998; Thompson & Warhurst, 1998). However, the high demand for complex skill sets often leaves industry facing skills shortages and the rate of change means that people need to be willing and able to participate in life long learning (Watts et al, 1992; Arnold & Jackson, 1997). This is particularly true within the computing industry, which is knowledge intensive and rapidly changing (Fincham, 2000). In contrast there are other new jobs that are part-time and lower status; with a widening division between these two groups (Hutton, 1997).

The world of work is apparently becoming more market driven (Arthur, 1994) and the relationship between firms and individuals may be shifting from relational to transactional contracts (Mirvis & Hall, 1996). The relational contract was based on an ongoing relationship between the individual and the organisation that involved an exchange of both monetary and non-monetary benefits. However, the transactional contract is defined in terms of a monetary exchange over a fixed period. The individual is contracted because of their specific skills and competencies to achieve short-term targets and new performance based criteria are used to measure and reward people according to their contribution and effectiveness (Arnold & Jackson, 1997). The focus appears therefore much more on the individual and attributing success or failure directly to their actions.

Consequently, job stability may be a thing of the past and inter-organisational mobility no longer necessarily frowned on. In fact IBM, once the model a life-time employer, is reported to have been worried in the early 1980s about turnover being too low and not providing enough opportunities to bring in new people with fresh ideas (Kanter, 1993; Sennett, 2000). Increased inter-organisational mobility means that employers less often have the luxury of appointing "known" internal candidates for positions and employees less often have the chance to establish a "reputation." There is therefore greater need for employers to be able to evaluate quickly and accurately individuals' worth to the organisation; likewise for people to evaluate the value of the employer to them and to be able to establish their value independently of their employer. Similarly forming temporary, interdisciplinary teams for relatively short-term projects requires the definition and measurement of individuals' skills and competencies and an assessment of the combination of skills needed (Arnold & Jackson, 1997). It therefore becomes increasingly important to be able to define what people know and

can do. Breaking down roles into core competencies and creating temporary teams of people who combine those competencies also leads to specialist boundaries becoming more fluid (Arnold & Jackson, 1997

Additionally, there are greater numbers of women working than in the past (Jackson et al, 1996; Watts et al 1992). Some of the changes in the nature of work, for instance the increase in part-time work, may favour women. More forms of opportunity and power outside traditional, large, slow to change corporations may provide women with more opportunities for leadership (Fondas, 1996; Kanter, 1993).

Women are generally perceived to have better interpersonal skills and communication skills than men which are likely to be of increasing importance as companies become more customer-oriented (Burrell, 1996) and require greater team working. Women are also perceived to be more flexible and able to adapt to changes in the work environment (Fondas, 1996; Watts et al, 1992) which given the current climate should prove useful.

At the individual level, it is argued that the arrangement of work and careers is also changing. According to this view flatter, leaner organisations require people that are self-managing and who can cope with increased workloads and greater responsibility and accountability (Thompson & Warhurst, 1998; Kanter, 1993; Lawler, 1994). In order to decide and understand what needs to be done people need to have a greater understanding of their organisation's business and its strategy (Lawler, 1994).

However, this increased organisational involvement comes at a time of reduced expectations of job security and advancement and a possible shift in organisational commitment and loyalty so that it is more calculative and provisional (Jackson et al, 1996). Likewise people may be becoming more committed and loyal to their profession or project rather than to the organisation (Watts et al, 1992; Kanter, 1993).

Careers may also be changing so that they are less about externally visible progress up a hierarchy and instead become about individual development (Arthur, 1994) and the maintenance of portfolio careers (Handy 1995). People thus are likely to broaden and move horizontally as their career progresses rather than specialise and move vertically (Lawler, 1994). Emphasis is then placed on self-development and career self-management, which gives the individual a more active role (Jackson et al, 1996).

These numerous changes in work and employment suggest that people's working lives are becoming less predictable and more fragmented. Security no longer seems to come from being employed but from being employable (Kanter, 1993); that is from being valuable. Challenging jobs and opportunities for learning and skill development

in order to increase/maintain market value consequently become all important (Kanter, 1993). There seems to be increased demands on people to be flexible and to tolerate uncertainty, to behave proactively and even entrepreneurially (Kanter, 1993; Arnold & Jackson, 1997, Thompson & Warhurst, 1998).

Ideological Shifts

These changes to the economy, organisations and the world of work reflect wider ideological changes. We have apparently moved into a post-Fordist economy in which mass consumption, mass production and standardisation have been replaced by innovation, responsiveness and dynamism. Similarly, there has been a move from manufacturing to service industries and more emphasis on flexible organisations, labour markets and individual workers. Similarly, the organisational world is post-bureaucratic: rules and procedures are replaced by an emphasis on results; control, authority and hierarchy are replaced by contractual relations; and centralisation and formalisation by fragmentation (Exworthy & Halford, 1999). This is the enterprise culture in which energy, initiative, self-reliance and personal responsibility are expected. In such a culture, both organisations and individuals are encouraged to continuously achieve and improve (du Gay, 1996).

For the purposes of this thesis the differences between these terms are less important than their overall message, which can be broadly summed up as managerialist. Managerialism focuses on outcomes, missions, empowerment, competition, customers and the market (Exworhty & Halford, 1999). The logic of managerialism holds that organisations succeed through providing customer satisfaction (Carter & Scarbrough, 2000a) and focusing on their core business (Clarke and Newman, 1997). Managerialism is anti-bureaucratic and geared to change and flexibility (Carter & Scarbrough, 2000a). In fact, change is constructed as necessary, desirable and inevitable (Clarke & Newman, 1997). Managerialism is oriented towards action rather than reflection and ends rather than means; it is a can-do culture that values practicality (Clarke & Newman, 1997).

Management is valued because it is perceived as helping organisations to perform effectively and efficiently. It provides a way of coping with the complexities and uncertainties of the modern world (Clarke and Newman, 1997). Managers are the heroes; trade unions, politicians, bureaucrats and professions are the villains because they hinder management from doing its job, and get in the way of the free workings of the market (Pollitt, 1990). Managerial competencies and knowledge are no longer

specific to a particular organisation; they are universal, applicable to all organisations and transcend services and sectors (Clarke and Newman, 1997).

Overall, the rise of managerialism is linked with the favourable analysis of the achievements of the corporate sector as opposed to the suspicions engendered by the public sector (Pollitt, 1990). It is good to be "business-like;" this provides value for money, and apparent transparency and accountability (Clarke and Newman, 1997)

In terms of skills and expertise, there is a shift from an industrial to post-industrial society or knowledge society (Thompson & Warhurst, 1998). From this viewpoint western societies are undergoing a major transformation to societies based on information, knowledge and education in which knowledge workers, including professionals and technical workers, are the key resource (Bell, 1973; Reich, 1991; Drucker, 1992). Again the production of tangible, manufactured goods gives way to provision of services and the manipulation of symbols. This is basically an optimistic view that others have been more sceptical of, pointing out the socially divisive effects of these changes that lead to many who are left deskilled (Scarbrough 1996, 1999). However, there is broadly a consensus about the growing importance of knowledge and knowledge workers.

The growing importance of knowledge leads Gibbons et al (1994) to investigate changes in the production of knowledge. They argue that a new form of knowledge production is emerging: mode2. Under mode1, knowledge is discovered by professionals working within the academic and scientific communities. In contrast, mode2 knowledge is accumulated by human resources working in flexible, transient groups and is created in the context of its application. Mode1 knowledge is the abstract, decontextualised, stable, disciplinary, scientific and technical knowledge, whereas mode2 knowledge is contextualised, useful, transient and trans-disciplinary. Mode2 knowledge is in many ways more managerialist.

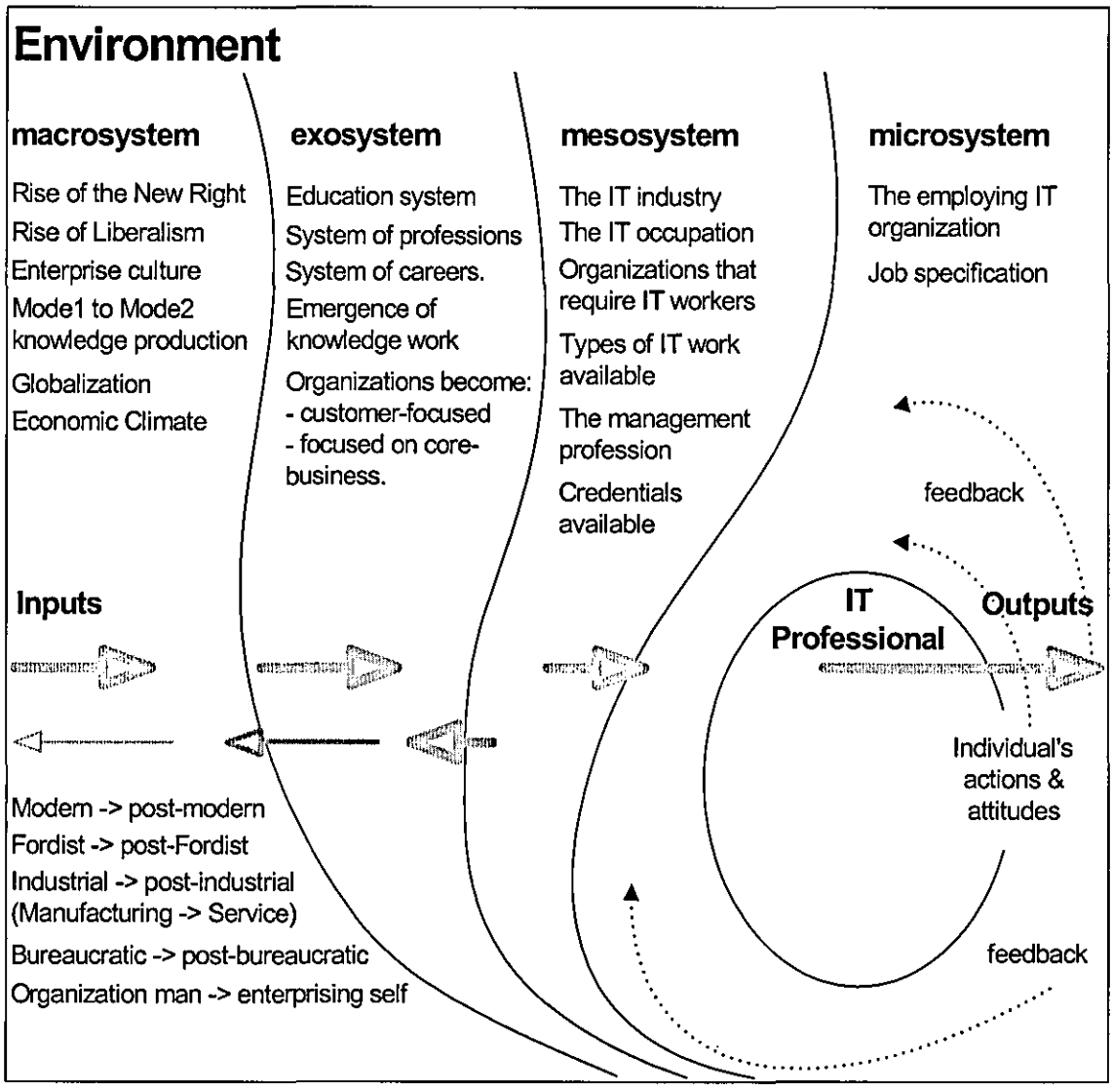
In terms of impact on the professional/managerial or knowledge workforce, Burrell (1996) describes a move from the baby boomer generation to generation X. The middle class baby boomer generation are the organisation men of William Hyde Whyte (1956). They regard hard work as the key to success. They assume that their expertise, loyalty and commitment to the organisation will be rewarded by life long employment within an organisation that cares about them. In contrast, generation X rejects large organisations as untrustworthy. Generation X is the enterprising self of du Gay (1996). It commits itself to itself and to its own learning and development. It

focuses on developing portable, temporary expertise and skills, which it is constantly renewing (Burrell, 1996). Again there are echoes here of the managerialist view.

However, Burrell argues that the changes taking place are not so much a shift to post-industrialism but from a modern to a post-modern society. The certainty of modernity gives way to relativity and fluidity. The postmodern society is about individualism and the celebration of diversity. Mass production and consumption give way to flexibility and differentiation (Burrell, 1996). Scientific claims to certainty and absolute truth are replaced by the buying and selling of expertise in the market place (Scarbrough, 1996, 1999). According to this view truth is thus in the process of being replaced by market value and the unpredictability that goes with it. Curiously, in some ways managerialism seems to share some of the same impulses as the postmodernist view, although these may amount more to the rhetoric of choice and acceptance of diversity than its reality.

Many of the ideological shifts described above are depicted in Figure 2-1.

Figure 2-1: The Environment of an I.T. Professional



2.1.2 The Development of the I.T. Industry

The development of the computer industry has taken place within this dynamic organisational and employment context and reflects these wider influences. During its short lifetime the computer industry has undergone huge changes in the technology that it manufactures and supports and also therefore in the skills perceived to be needed by computer specialists. It has also seen huge changes in who its customers are and in its position in relation to those customers, which likewise has had a bearing on the skills perceived to be needed.

The development of the computer industry can be divided into three phases. Friedman & Cornford (1989) view technological change as problem driven and see these phases as dominated by changing limitations due firstly to hardware, then software and thirdly user-relation constraints. Dalgleish, (2000) takes three slightly

different time periods and views the industry as moving from a culture of domination of its stakeholders, through conflict, to tentative collaboration with its stakeholders. Although published 11 years apart, both descriptions tell a very similar story. An amalgamation of these two views is given below.

The first phase – 1960s into the 1970s

Computing emerged after World War Two as a hybridisation of mathematics and electrical engineering. However, it was not until the early 1960s that commercial computing came to the fore. During this first phase, Friedman and Cornford argue that hardware constraints dominated the industry. Computers were costly and limited in what they could do. They were used to automate routine, well-understood, large data processing tasks, such as payroll. Thus only large corporations had the resources or the need to employ them. I.T. specialists had considerable autonomy with their managers only having a vague idea about what they were doing. I.T. groups exercised their power over the organisation through their technical knowledge and expertise. Dalgleish (2000) describes the I.T. culture at this time as controlling, directive and domineering towards its stakeholders (Dalgleish, 2000).

The second phase – 1970s into the 1980s

The second phase saw a move towards tools for less formalised, more ill-defined and thus more complex problems and applications. The value added by the technology changed from being in the application of the relatively inflexible hardware to that of the more malleable software and the ability to shape that software to meet user needs (Friedman & Cornford, 1989). In fact, the software industry has been growing exponentially since the late 1970s (Correa, 1995). This phase was also marked by the advent of the personal computer and packaged software and saw the more widespread use of computers. The market in I.T. hardware was thus overtaken in the 1980s by the rapid growth in software and consultancy with the consequent rise in demand for skilled people within those areas (Connors, Buchan & Pearson 1989).

Also during the 1970's and early 80's more formalised and practical computer science education became available (Dalgleish, 2000). Universities started to offer joint honours degree courses combining computing with other subject areas and other subject areas incorporated I.T. into their programs. I.T. knowledge, skills and expertise were becoming more commonplace and users more knowledgeable.

These technical and social changes led to high expectations for the return from I.T. investments (Earl, 1992). I.T. departments increased in size and organisational spending on I.T. increased enormously (Friedman & Cornford, 1989). However,

expectations were not fulfilled, the computing industry began to gain a reputation for unreliable systems that did not do what users wanted and that were delivered late and over budget (Grindley, 1995). Computing seemed to be out of control and managers therefore sought to bring it into line.

Whereas, companies' average spending on centralised I.T. had been rising each year since the 1950s, in 1985 it fell in most western countries, including the UK (Grindley, 1995). I.T. departments were rationalised and headcounts reduced (Earl, 1992). The cutting of I.T. budgets reflected businesses' increasing concern with costs, results, value for money and more broadly the adoption of a managerialist agenda. Dalgleish (2000) refers to this "strong backlash by business against I.T." (p4). During this time I.T. came under increasing pressure to be responsive to business needs and to adopt a service culture. Dalgleish observes that I.T. became defensive and in conflict with its stakeholders. It sought refuge in developing scientific answers in the form of tools and methodologies to automate and systemise systems development work and to make itself more effective (Dalgleish 2000, Friedman & Cornford, 1989). Thus computing attempted to shield itself from criticism behind modernist solutions where a more post-modernist flexibility and dialog might have been more appropriate.

The third phase – 1980s until mid 1990s

The third phase reflected the continued rise of managerialism and prominence of business values within organisations. It saw a move away from the I.T. function as a central overhead towards the I.T. function as a profit or cost centre (Scarbrough, 1996b, Grindley,1995). Indeed some organisations, rather than continue to manage their own I.T. resources, decided to outsource them (Pinnigton & Woolcock, 1995). Organisations showed increased interest in market like structures and service delivery contracts were created in order to measure and monitor the costs and contribution of I.T. (Scarbrough 1996b, Grindley, 1995). For instance, a Price Waterhouse (1990) survey suggests that in 1989, 59% of computer installations had no measures of efficiency, whereas by 1990 almost all installations had such measures.

There was a shift in focus from software that performed tasks to systems that produced results and added-value (Friedman & Cornford, 1989). The scope of computers thus became less discrete as they became involved in different functions and more fully integrated into the business (Dench, 1998). Their purpose also became less well-defined as it became linked with business objectives. Whereas originally computers had been used to automate existing tasks, further spending on

automation yielded fewer and fewer gains. Business advantage now came from the integration of systems so that data could be combined, compared, analysed and interpreted (Watts et al 1992). The top problems faced by I.T. executives from 1980-87 were meeting project deadlines, however from 1988 onwards there was a new top concern with integrating I.T. with corporate objectives (Grindley, 1995). Integration of I.T. with the business involved the computer industry in organisational design and the rethinking and redesigning of business processes; hence the rise in Business Process Reengineering and its links with I.T. Business was thus becoming increasingly dependent on I.T. as computers became more involved in management and planning functions and started to play a strategic role. Business's need for control of and integration with I.T. can be seen by the appointments of I.T. executives at board level (Grindley 1995).

The main limitation of this phase, according to Friedman & Cornford, were the difficulties involved in finding out what the user wanted the system to do, rather than the technological considerations involved in meeting those needs. Consequently, various strategies were adopted such as prototyping and user involvement in systems development, to facilitate communication between I.T. personnel and users. In Dalgleish's terms the development of commercial I.T. can be seen as a shift from I.T. control, to business control to this third phase of a tentative partnership between I.T. and business.

The competitive significance of I.T. is no longer questioned; how to achieve strategic benefits though is not clear, however appropriate I.T. staffing is vital (Reich & Kaarst-Brown, 1999). Today I.T. is more contained and focused on providing value through service to customers (Dalgleish, 2000). It is also under greater pressure than ever before to perform. Its problems are exacerbated by the rate of technological change, unrealistic expectations of users, and general management's inability to understand the significance of the technologies at their disposal (Couldwell, 1998). I.T. managers thus face these pressures whilst their budgets and personnel have been cut.

To Sum Up - Changes to the I.T. industry

The changes just outlined are depicted in Figure 2-2 and summed up below.

The British economy appears to have experienced a shift in emphasis from producing products to providing services. Likewise, the focus of the I.T. industry during the past 40 years has changed from companies that predominantly produced large computing machines to companies providing services and solutions. These changes can be seen in the way for instance IBM and ICL, both formerly large hardware

manufacturers, now market themselves as solution providers. Large organisations now no longer want to buy a machine or a piece of software that will automate an existing task. Instead, they want to buy a system that improves the way that they do business. This requires the new system to be integrated with their other systems and organisations do not want the cost and risk of doing the work themselves. Hence computer companies now provide that service and expertise.

The function of computing within organisations has also changed from that of a centralised computing or data processing department whose focus was on the maintenance of the computing equipment to information centres that provide consultancy type initiatives, services, support and advice. Whereas once they wrote their own software they now buy off the shelf packages and customise them.

The customer orientation of the wider context is reflected in changes within the I.T. industry. Both computer companies and the I.T. function have become progressively more involved in their customers' businesses. Equally, the clients have also become increasingly involved with computers. I.T. professionals were once peripheral, hidden away from their users and their users were few. Now their work is integral to the organisation, their users are business units and business managers and the two groups must interact. The history of the I.T. industry can be viewed as attempts to refocus from machine to software to user to customer. The skills that are needed by computer specialists have thus undergone corresponding shifts and the careers of computer specialists have had to ride out and refocus in response to these changes.

Figure 2-2: Changes to the I.T. industry 1960 - 2000

Little management control / IT Autonomy Used by large organisations Poor management understanding of I.T. Technology limits applications IT dominates stakeholders Automation of routine tasks	**Business Backlash** Used by all organisations Management asserts control Rise in consultancy and software development Formalised and practical computer education Unfulfilled user expectations / conflict with stakeholders Pressure to meet business needs Defensive I.T. response	**Business - I.T. Partnership** IT integral to organisations / dependence on I.T. Strategic role for IT IT as a profit or cost centre or outsourced Focus on added value IT strategy aligned with corporate goals Service to customers Integrated systems

2.1.3 Conclusion to Part 1 - Context

It seems that we have moved into a new employment world in which the old employment "rules" no longer apply. It is not just that the employment world has changed but that it is continually changing. It is therefore a less predictable world in which to work. Employees need to be able to tolerate employment uncertainty and insecurity and be flexible and active in dealing with that uncertainty. Should their employing organisation no longer require their services then they need to be capable both emotionally and according to their skills, of finding employment elsewhere. They need to be able to "read" the changes that are taking place in their organisational and occupational environments, recognise what knowledge and experience are important and identify how to maintain and extend their skills and value.

People also need to be flexible in terms of their role. They need to be able to apply themselves to different tasks depending on where they are needed. They also need to be able to exercise initiative, be proactive and not necessarily expect to be closely directed. There is a concern within organisations with efficiency and value for money. Performance is key and people need to ensure that they are seen to be performing at the required level. Greater demands for breadth, quality and quantity of work are therefore being made on people.

In contrast and probably in response to this variability and uncertainty, organisations themselves have become much more focused. They have missions, goals, a core

self that they must be true to. They expect their employees to contribute to their mission and reward them according to their contribution. Employees are expected to understand the organisation's aims and their role in furthering them. Employees therefore need to be more aware of the organisation's "business" and to take more responsibility for moving it forward than in the past. As organisations become more customer focused individual employees and their skills and competencies become crucial to customer responsiveness and providing the customer with a unique service. However, these extra demands on employees are being made at a time when the organisation's commitment to their employees and their employees' commitment to the organisation may be diminishing (Thompson & Warhurst, 1998). Thus paradoxically employees are required to enter into partnership with their employing organisation whist maintaining a psychological distance from the organisation.

In this world hierarchical position is a less readily available indicator of value. Flatter organisations mean that traditional hierarchical career paths are no longer so accessible and people need to find other routes and ways of demonstrating their value and judging the value of others. Interpersonal skills become crucial in a world that involves networking, the creation of cross-functional project teams and interdisciplinary understanding and communication. Broadly, the sorts of skills that people need to be valuable in this brave new world of work are likely to be intellectual and cognitive rather then hands on and manual.

The computer occupation is interesting as it is part of an industry that has grown up within this period of transformation. The computer industry is deeply involved in the new technology that has helped to bring about these changes and the changes are reflected in its own development and features of the industry. For instance, the computer industry has changed from being hardware and product focused to becoming much more service and customer orientated. It is also an industry that favours project work, requires complex professional/technical skills sets and faces skills shortages. Mobility within the industry is legendary, updating a problem and outsourcing popular (Grindley, 1995). These are all features of a profession in today's new and uncertain world

The new employment world appears to be a flexible and changeable environment and the I.T. industry is an example of an industry that seems to be trying to embrace these features. The skills that are valued are much more fluid, contextual and transient than in the past. How a sense of orderliness and coherence is created to form a career within an industry that has seen such huge changes in skills and context over a relatively short time span (i.e. within one occupational generation) and

which continues to experience fashions in technology and trends in skills is therefore interesting. It is also especially relevant given the current emphasis that is placed on the quality and expertise of staff in general.

2.2 THE I.T. OCCUPATION

This section looks at what sort of occupation computing is and consequently the implications this has for the skills, expertise and competencies (as defined in 1.2.3) that are valued. In trying to define what is and is not of interest within this study it was necessary to consider distinctions between computing and related terms and occupations. This thesis takes the position that occupations exist within an interdependent system of other occupations (Abbott, 1988) and that no distinct boundary necessarily exists between one occupation and another. Therefore, when investigating value within computing it is necessary to ask not only what is the computing occupation but also to look at where it is situated in relation to other occupations and other occupational categories. Computing's place within this "system of professions" (Abbott, 1988) thus helps to define it. In turn, perceptions of individual value and expectations of careers within computing depend on how the computing occupation is constructed. Two classes of occupations that are often mentioned in the research literature and which are of relevance to the computing occupation are those of professions and of knowledge work.

The first section in this part of the literature review explores professionals and professionalism. Some of the findings from this section are then applied to the computer occupation. Thirdly, professionalism is contrasted with knowledge work and computing is shown to be more appropriately viewed as knowledge work. In conclusion, the implications of computing as knowledge work for how computing skills and careers are defined are briefly explored.

2.2.1 Professionals

The label professional has been used to signal someone who has undergone extensive training and who has achieved an appropriate standard of practice. It is a label used to assure others of a person's level of understanding and skill so that they can be confident in the person's abilities. It can be used to give dignity and status to an occupation, job or person. However, what is a professional?

There are different ways of defining what counts as a profession. Definitions may rest on occupational categorisation, which depend on the prestige and socio-economic status given to an occupation; or on functional criteria, looking at what members of an occupation actually do; or may be determined at an individual level by a particular person's attitudes (Raelin, 1991). The Standard Occupational Classification includes "engineers and technologists" in its list of major professional groupings (Watts et al,

1992). Similarly Raelin (1991) uses an occupational categorisation to list some common professions. In his list he includes "engineers and computer scientists" (p.9).

Kerr et al (1977) use the literature to produce a functional categorisation of a typical professional. They conclude that there are six characteristics that are consistently used to define professionals – see Table 2-1 (Kerr, Von Glinow & Schriesheim 1977). These characteristics have come to form a consensual definition of professionalism amongst many researchers interested in professionals (Raelin, 1991; Von Glinow, 1988; Morrison & Vosburg,1987).

Table 2-1: Functional Definition of Professionals

Expertise	Often gained from prolonged and specialised training in a body of abstract knowledge.
Autonomy	A perceived right to make choices about both means and ends.
Commitment	To the work of the profession i.e. showing primary interest in pursuing the practice of ones chosen speciality.
Identification	Identifying with the profession and fellow professionals.
Ethics	Rendering services without concern or self interest and without becoming emotionally involved with clients.
Collegial maintenance of standards	Commitment to policing the conduct of fellow professionals

2.2.2 Scientists and Engineers and the Quasi-Professional

A large number of early studies of professionals use scientists and engineers in their samples, sometimes not even distinguishing between the two groups (see Kerr et al 1978). Similarly, studies often subsume computer workers under the occupational category of engineering (e.g. Watts et al, 1992; Raelin 1991; Von Glinow, 1988). Intuitively it would seem that computing as an occupation is quite closely related to engineering. For instance computing is said to have roots in electrical engineering (Fincham 2000) and microelectronic engineering would seem to be an enduring bridge between the two.

The closeness of computing and engineering are given a more detailed and considered placement in Holland's (1992) occupational classification. Holland classifies occupations according to a three-letter code showing the three most prevalent personality traits of the people who work within the occupation. In his classification computer operator = ICR (Investigative, Conventional, Realistic), engineer = IRE (Investigative, Realistic, Enterprising) and computer programmer = IRC (Investigative, Realistic, Conventional). The two computing roles (operator and programmer) and "engineer" all involve people who are investigative and realistic and are therefore quite closely related. Also the British Computer Society (BCS), the

professional body for computer workers in Britain, has links with the Engineering Council and the Institute of Electronic Engineers and has sought professional status through its association with engineering (Fincham, 2000). Even the job of programming has more recently been partially replaced by the term software engineering and there are also computer scientists. Computing is relatively closely linked with engineering and somewhat more remotely to science. More generally these occupations are classed as technical or sometimes high-tech.

The classification of scientists or engineers, let alone computer specialists, as professionals is not agreed (Badawy, 1970). Thus Kerr et al (1977) use the literature to investigate and differentiate between the professionalism of the two by applying their six professional criteria. Given the lack of specific studies of computer professionals and the apparent closeness of computing to engineering, their observations might illuminate perceptions and expectations of computing and computer workers. The findings are presented in Table 2-2 (Kerr, Von Glinow & Schriesheim 1977)

Table 2-2: Relative Professionalism of Scientists and Engineers

	Engineers	Scientists
Expertise	Less rigorous (i.e. shorter) educational background; value practical and pragmatic knowledge	More rigorous education; they value more abstract knowledge.
Autonomy	Often given problems and the means to solve them.	More autonomous
Commitment	Thought of their careers in terms of their organisation. More interested in organisational power and participation and management.	Committed to careers within their field.
Identification	Did not maintain strong contacts with professional associations or referents	Maintained strong contacts with professional associations or referents
Ethics	No strong ethical foundation – they were more interested in their contribution to their organisation rather than to society. But were committed to the value of service.	Stronger ethical foundation.
Collegial maintenance of standards	Less concerned with upholding standards and policing each other	More concerned with the upholding standards.

Kerr et al conclude that scientists as an occupational group are more professional than engineers. From their description of engineers and scientists, computer specialists seem more like engineers than scientists and could likewise be regarded as less professional than scientists.

Professional is therefore not a well-defined concept. At best it is a non-discrete category or continuum with occupations being more or less professional. The term quasi-professional (Raelin, 1991) is often used to describe occupations such as engineering and accountancy that seem to fall in the middle of this range, between professional and non-professional. Therefore computing could also be classed as a quasi profession. It might also be regarded as a young profession that over time might develop into a full-grown profession like medicine or law. Alternatively, it could be argued that computing is an example of a new kind of profession, which reflects the more commercial values of the time in which it was born.

2.2.3 The System of Professionals

The exact labelling of computing as a profession or not is beside the point here. Rather it is interesting to see where computing falls in relation to other occupations and the ways in which those occupations have been conceptualised i.e. in terms of expertise, autonomy etc. The professionalisation literature is often overly preoccupied with the task of defining professions, either statically in terms of common traits, or dynamically in terms of a common evolutionary pattern, rather than asking deeper questions about professional work itself. An exception is Abbott (1988) who questions why certain professions seem to survive, while others die, why certain types of work come under the control of one profession rather than another and about the interdependence of different professions.

Consequently, Abbott takes a systematic view of professions rather than looking at a single profession. He introduces the term "jurisdiction" to describe the link between professionals and certain areas of work or certain tasks. These jurisdictions are like work territories that professions have control over and which they defend. Thus professions develop by taking over lost or newly created jurisdictions, they are rivals for jurisdictions and "do battle" over jurisdictional boundaries. This system of professions, he argues, is driven by competition for control of abstract, expert knowledge and for the control of the application of that knowledge. Professions thus try to claim as broad and exclusive a jurisdiction as possible (Tolbert, 1996)

Abbott suggests that abstract knowledge is what best distinguishes a profession from, say, a craft, because it both enables the profession to define and defend old problems in new ways and also enables new problems to be seized and incorporated under the existing profession's jurisdiction. Thus it is the abstraction of the knowledge of a profession that "enables survival in the competitive system of professionals" (p9). Abstraction enables a profession to broaden its jurisdiction. However, a large and

thus diverse jurisdiction is vulnerable to specialisation and splits from within and the boundaries between the profession and others become blurred. Thus breadth and exclusivity are often competing objectives (Tolbert, 1996).

Unlike a landed territory where boundaries and borders can be made visible and distinct, an occupational jurisdiction is less tangible. Its boundaries and definition rely on societal recognition and acceptance of the claims that are being made. These claims are continually being advanced via, for instance, public media, legal discourse, workplace negotiation and professional societies (Abbott, 1988).

Tolbert (1996) uses the term "codification" (p336) to denote the degree to which occupations are commonly identified with clearly defined sets of skills, knowledge, tasks and problems. Codification thus implies the existence of social understandings about the work activities that occupational members can and should be responsible for. Consequently, codification is central to the successful assertion of jurisdictional claims. Further, Tolbert points out that some common characteristics of professionals - standardised education and training, professional association, strong member identification - are likely to be associated with high levels of codification. Codification thus helps employers define relevant skills packages for particular types of work and provides standards for evaluating existing employees and new candidates. It also provides employees with information and assurance about relevant experience, training and credentials for particular types of job and helps them enhance their marketability.

2.2.4 The Computing Profession and its Jurisdiction

The rapid development of computer knowledge and the pace of technological change within the computer industry are suggested to be the most important contextual factors affecting the computer occupation (Abbott, 1988; Friedman & Cornford 1989; Scarbrough 1993; Fincham 2000). Technological innovations drive the demand for skills and for new computing specialisms. The computing occupation is somewhat "autogenerating" (Friedman & Cornford, 1989, p360; Fincham, 2000) in the sense that the development of new technology is not necessarily a response to external demand but a creation of the occupation itself. The occupation thus enhances its jurisdiction by creating new technology and through it new work, skills, expertise and ultimately careers for itself. Conversely the occupation and its jurisdiction are defined and in some ways constrained by the associations society makes between the occupation, technology, work, skills, expertise and careers. An occupation can in this way be

viewed as both creator and created by the work that it does (Abbott, 1988) and with computing, technological change is central to these processes.

Abbott (1988) comments that a striking feature of computer profession is that its limited knowledge i.e. of computers and programming languages, has translated into a great deal of control over the nature and extent of the information generated. Indeed the widespread use of computers by many diverse professions has given the computing profession access into many different jurisdictions. Abbott suggests that an opportunity exists for the expansion/creation of a new jurisdiction that unifies information workers. However, he argues that computer specialists see this unification problem in terms of providing better "treatment" (see section 2.4.8) for the information generated, i.e. in terms of applying computer hardware and software to the information and to information problems. Within his system of professions, applying different treatments to an area is a weak claim for jurisdiction because it involves no reasoning or inference about the problem. It accepts the problem as it has been defined by others and only claims to solve it in a better way. Computing, dealing as it does with a small part of the overall information area, fails to encompass fully the jurisdiction. Put simply it has not made an abstract enough claim which ultimately could lead to a separation between managing the information and managing the technology, leaving current I.T. professionals with a more limited role within organisations and a more limited career (Goldsworthy, 1996).

Thus the computer profession's close links with technology on the one hand appear to give it an anchor that provides the profession with focus and coherence. In addition, it enables the profession's jurisdiction to grow in tandem with technological expansion. However, on the other hand its reliance on the treatment of problem areas via technology is too concrete and restricted an answer to enable widespread threats to other jurisdictions and is made even less tenable by the rapid changes in that technology.

Many of the developments in computer knowledge and technology have involved the commodification of knowledge and expertise into products (Abbott, 1988; Scarbrough 1993). Although commodification of knowledge is often associated with deskilling, routinisation of work and reduction of the organisation's dependence on specialist skills (Kraft, 1988), in fact within computing commodification seems to have had the opposite effect. From this alternative viewpoint, automation can enhance an occupation by taking away the more routine work and increasing workers' productivity. Also standardisation and commodification enables I.T. expertise to be abstracted and produce effects that are independent of social context and

consequently to be applied across many different sectors. In fact the explosion in I.T. applications in the 1970s and their continued growth has led to increased demand for computer skills and more and more opportunities and new areas of expertise for computer professionals (Abbott, 1988; Scarbrough, 1993). Commodification also supports the codification of I.T. expertise, assisting with the social understanding of what tasks and work come under the remit of the I.T. occupation and likewise with the workings of the occupational labour market (Tolbert, 1996). Commodification of computing knowledge has also led to computing becoming increasingly complex, with more and more layers to understand. This increased abstraction and depth can also help to enhance the occupations standing (Abbott 1988). Also rather ironically, the very abstraction and decontextualisation (generalisation) of the commodified knowledge has meant a huge growth in demand for skills in customising and integrating packaged software within specific organisational contexts.

Computing as a profession, like engineering with its close ties to technology, is relatively practical and pragmatic (Fincham, 2000). Also computer specialists are mostly employed within the commercial world of business where it is what works and what is of benefit that counts rather than more abstract, academic ideas and theories. The market for computing goods and services, particularly since the 1980s business backlash (section 2.1.2) thus appears to value "usefulness." Consequently, the computing profession only needs knowledge that is abstract enough to keep up with the changes in technology and the market's demand for useful products and services. However, more abstraction might lead to opportunities to take over parts of other's jurisdictions.

More recently, it could be argued that the computing profession has become more abstract and less exclusively focused on technology. For instance, as mentioned earlier, I.T. has made a bid to place itself in a more organisationally strategic role. This could be interpreted as a manoeuvre for occupational power (Scarbrough 1996b). However, Scarbrough (1996b) judges that I.T. mostly plays a support role and only occasionally operates at a strategic level when organisation-wide I.T. projects are developed. The I.T. occupation may therefore be trying to change and strengthen its role but has some way to go.

The rapid speed with which technology and the market for computing goods and skills changes also means that the computing profession needs to be flexible. In keeping with this and its pragmatism, computing is less rigid than many traditional professions in terms of its occupational training and entry criteria. Indeed its "limited knowledge," as pointed out by Abbott, implies that extensive training is unnecessary. Also there

appears to be little attempt to achieve professional exclusivity and control as entry to the profession does not appear to depend on acquiring that limited knowledge. This flexibility of entry into the profession is reflected in a more widespread lack of collective professional control and a general lack of collective mobility. Although computing with its technical and codified body of knowledge has the expertise that professional claims could be built on there is little evidence that this is happening (Fincham, 2000). The British Computer Society according to Fincham (2000) "resembles a society of enthusiasts rather than a professional body" (p7). He estimates that practitioners outnumber members by 10 to 15 times. Computer professionals do not appear to need a professional body to try to enhance or protect their status and do not seem to have standards of practice to uphold or to enforce in others.

Computing also seems a less rigid profession than others in terms of what does and does not fall under its jurisdiction. Over the professions short lifetime its jurisdiction seems to have changed greatly, and neither in the past nor now has its exact jurisdiction been well-defined. This flexible structure suits the computing profession's rapidly changing environment enabling it to react to increases in demand and changes in technology and work tasks. Given that technological change is one of the main features of the computing environment the flexibility to incorporate new technologies under its jurisdiction is an advantage. However, it does mean that the occupation is in a constant state of flux (Scarbrough, 1993). In a sense, its lack of identity appears to be part of its identity. Unlike more rigid professions which may deal with attack in a monopolistic way the computing profession does not necessarily need this kind of protection and anyway might find it limiting given the fact that its jurisdiction is constantly changing. Abbott (1998) describes professions that give up the absolutes of credential closure, monopoly of service, personal autonomy and clarity of occupational identity in favour of a generalist's ability to adapt and follow new trends, as "federated." Alternatively, Fincham (2000) concludes that computing is marked by weak professionalisation and is better characterised as "knowledge work." Indeed commercial computing seems to exemplify knowledge work.

2.2.5 Knowledge Workers versus Professionals

There appears to be a rise in the number of "knowledge workers" (Drucker, 1988) who are active in the economy and an increasing interest in them in the literature. Scarbrough (1999) defines knowledge workers as "occupational groups who experience knowledge as the object of their work" (p5). In contrast to the traditional

model of professionals but in accordance with computer specialists, they are therefore primarily defined by the work that they do rather than for instance, the professional institutions that they belong to or the education and training that they have had. However, Scarbrough (1999) points out that one of the defining features of knowledge work is its ill-definition. As with the comments about computing above, knowledge work in general needs to be relatively unstructured, ill-defined and de-centred in order to react quickly to changes in organisational and wider market demand. Knowledge work in some ways appears as the post-modern equivalent of modernist professionalism.

It seems that it is partly this emphasis on and exposure to labour and product market forces that have led to the general decline in professionalism as a way of organising knowledge (Scarbrough, 1999). These market forces, Scarbrough (1999) argues, take the place of professional norms and practices. Thus knowledge workers have the autonomy traditionally associated with professionals. However, instead of gaining power, status and control by monopolising specialist knowledge via professional institutions and structures, they, as do computer specialists, rely on the labour market position that their specialist knowledge and skills afford them.

This market orientation means that knowledge is regarded as a commodity, which is paid for and judged by the market. In contrast to professionals, knowledge workers therefore have a less normative, more instrumental attitude to their knowledge base, which is valued for its usefulness, rather than its more general goodness, rightness or truth-value. It therefore aligns more with a mode 2 view of knowledge. Assessment and reward for the quality of "professional" work goes against the traditional model of professionalism where the quality of the work was beyond challenge, particularly beyond the challenge of clients (Watts et al 1992). Thus whereas traditional professionals work according to their professional codes, knowledge workers focus on satisfying the needs of their customers (Burrell, 1996). It is no longer about giving pure detached advice but about the relevance of that advice and its contribution to organisational goals and profitability (Watts et al 1992). Within the computing industry for instance, user needs have become ever more important and service delivery contracts have become increasingly popular.

The focus on the market in knowledge work also permeates the skills and careers of knowledge workers. For instance, claims of I.T. expertise and competence are continually being put forward and evaluated in the I.T. labour and product market place (Scarbrough, 1993). The codification (Tobert, 1996, mentioned previously) of knowledge-based occupations is thus very market dependent. This codification and

evaluation of the occupation's knowledge claims reduces the individual computer worker's claims to those of competence in the "labour market currency of negotiable skills" (Scarbrough, 1993, p944) that develops around I.T. Individual computer professionals are therefore driven to invest time and effort in acquiring the marketable skills, expertise, knowledge and careers that the market judges as valuable. Success and value are less normative, they are about having a tradeable skill that can be measured, costed, bought and sold (Watts et al 1992). Workers may try to sustain both their marketability and awareness of this value system through inter-organisational moves and involvement in the wider I.T. culture and occupational networks (Scarbrough 1996)

Central to professional work is the maintenance of professional networks. This is usually facilitated via professional associations, meetings and correspondence. For knowledge workers formal means of networking play a lesser role. However, means of differentiating particular areas of expertise, defining them as specific occupational entities and tying individuals into those occupations are nevertheless important. In this regard, the relationship of I.T. work and expertise with the socio-economic networks that underpin the development of computer technology are all important (Scarbrough, 1993). If this relationship were significantly altered or lessened then the identity of the I.T. occupation and the nature of I.T. expertise would also necessarily change. This relationship is effectively what gives computer specialists their identity and is where their power and status, such as they are, derives.

A further distinction made by Scarbrough (1999, 1993) between knowledge workers and professionals is that professionals work *from* an occupationally defined body of knowledge and have power *over* organisations, whereas knowledge workers work *with* knowledge and have power *within* organisations. Professionals exercise power over organisations via professional and regulatory systems, which they use to secure control over a task domain. Whereas knowledge work is less about applying predefined expertise and more about the continued creation and application of knowledge in context – it is a much more social constructivist view of knowledge. This distinction implies a much more involved relationship between the knowledge worker and the organisation and a more distant one between the professional and the organisation. The context for knowledge work is thus the organisation (Scarbrough, 1999). Even for workers whose occupation is of prime importance the values and demands of the organisation cannot be ignored because it provides the resources and environment in which most occupational careers are pursued (Van Maanen &

Barley, 1984). Knowledge workers, including computer specialists, are therefore heavily dependent on organisational employment for their work.

The organisational context and the market are therefore all important in knowledge work and also all important for the computer occupation. Knowledge work is more in line with the notion of mode2 knowledge and the post-industrial society outlined in section 2.1.1. Consequently, knowledge workers are Burrell's generation X as opposed to baby boomers or organisation men of the past. The comparisons made above between knowledge work and professionalism are not meant to imply two distinct occupational groups. Rather they are made to clarify what is meant by knowledge work and to show two possible ways of regarding the computer occupation. The two categories are in many ways similar and may overlap with occupations seeming to fit both categories. Indeed, due to market pressure, professionals as a group may be changing to better resemble knowledge workers.

2.2.6 Conclusion to Part 2 – The I.T. Occupation

Computing as an occupation is quite closely related to engineering. More generally, it is a technical occupation and thus is also associated with science. It is not a typical profession; along with engineering it more appropriately falls into the category of quasi profession and may be better characterised as knowledge work.

Computing is often subsumed under other occupational categories e.g. engineering or technology. This tells us little about computing as a specific occupation, particularly given its diversity. Few studies focus on computing as an occupation in any depth. To distinguish it as an occupation in its own right and talk at a detailed level about the skills within the industry and their development seems useful, especially given the wider societal perceptions of value placed on it – computing is associated with new technology, and progress (Fincham, 2000). Of particular significance is the economic importance ascribed to it for both individual organisations and larger economies (Grindley, 1995).

This section suggests that those who fit well within the computing occupation are likely to have skills closely linked with computing technology. However, there is a potential tension here. Although that technology may give computer specialists a focus and power it may also constrain them in ways that associations with more abstract knowledge would not. The occupation may be becoming more abstract and broad but this change in itself may come as a challenge to those within it. Computer specialists, like engineers, may tend to be practical and pragmatic rather than academic and theoretical. To be valuable they should possibly be commercially or at

least user aware. They should also probably be focused on what is useful, in providing a service and satisfying the needs of customers. Computer specialists are likely to be defined by the work that they do and rely on their specialist knowledge and the current market value of that knowledge for their value. Standards of work for both assessment and practice appear to be fluid and not particularly well-defined.

In terms of their development, computer specialists do not appear to need particularly intensive or specific training. To be valued they do seem to need to be flexible, able to change and learn new things, especially new technologies. In particular, they are likely to need to be in tune with organisational and wider market demand; to anticipate changes and reposition themselves accordingly; and to put time and effort into gaining and sustaining marketable skills. The onus appears to be on self-management and self-development within an organisational context. Given that they are organisationally bound they may be interested in traditional, organisational careers and moves into management.

The computer occupation is important in its own right. However, it also has a wider significance as an example of a type of knowledge work, as a high-tech or technical occupation and as already mentioned, a "new" profession operating in today's "modern," uncertain world. There is increasing recognition that knowledge is of economic importance to contemporary societies and firms (Blacker, Reed & Whitaker, 1993; Scarbrough, 1999). However, knowledge workers have received relatively little attention in the organisational literature (Blacker, Reed & Whitaker, 1993) especially at a detailed level of particular occupations (Fincham, 2000).

In keeping with today's world of work as outlined in section 2.1.1, knowledge work is by its nature ill-defined and transient. Its responsiveness to market demands means that it is in constant state of flux. Likewise, the I.T. industry is constantly changing and adapting in accordance with technological change. An occupation generally provides a reference group or collective perspective that members of the occupation can affiliate themselves with and evaluate themselves against. However, sense making within such a changeable occupation as I.T. may make creating a shared identity or culture problematic. What notions of individual value are articulated and defined and what frameworks guide people along skill development paths within such a mutable occupation is interesting because of its very fluidity.

This thesis focuses on a particular occupation – I.T. – and the expertise within it. It aims to give a view of the value structure of the occupation, how value is defined, how skills are evaluated, i.e. what is expected of people in it.

2.3 THE ORGANISATIONAL CONTEXT: THE MANAGEMENT OF PROFESSIONALS AND KNOWLEDGE WORKERS

The organisational context in which computer professionals work, adds a further environmental and social dimension that influences the construction of interpretations of individual value within computing. Computer professionals, like other professionals and knowledge workers, are effectively involved in two different, and possibly competing, social systems: the occupation and the organisation (Van Maanen & Barley, 1984). Each social system may promote specific loyalties, encourage the professional to develop certain skills, to develop their career in certain directions and support particular sets of values. The organisation and the profession may send out conflicting messages thus tensions may arise that need to be managed. Professionals within organisations, the tensions that may arise between the profession and the organisation and how the these tensions and the organisation may influence perceptions of value within the profession, particularly within computing, are explored in this section.

2.3.1 Autonomous & Heteronomous Professionals

Distinctions are often made between independent and salaried professionals (e.g. Raelin, 1991) i.e. those who work for themselves, either solely or in partnership and those working for larger "bureaucratic" organisations. In addition Abbott (1988) makes a slightly different distinction between those who work for themselves or professional peers – autonomous professionals – and those who work in organisations not headed by their own profession – heteronomous professionals. Unlike more typical professions (e.g. law) computing does not really have the equivalent of the professional computer firm. By the former definition, most computer professionals are salaried. Abbott's distinction is however more useful: some computer specialists work in companies that are part of the I.T. industry and are therefore essentially autonomous, whilst others work in I.T. departments within organisations that are not part of the I.T. industry and are therefore basically heteronomous.

In autonomous (professional) organisations, the organisation effectively provides a setting for the activities of the occupation and it would seem that there is more likely to be a convergence of organisational and occupational interests. Whereas, within heteronomous (non-professional) organisations there is an incomplete overlap between the occupational community and the employing organisation and thus a

greater potential for conflict (Van Maanen & Barley, 1984). It is not that computer professionals working within computer companies are simply more autonomous, but that the goals of the organisation and their goals are more likely to align (see next section). Conversely, the goals of I.T. specialists working within computer departments and those of their employing organisation, given that the host organisation is not in the I.T. business, are more likely to be at odds. Outside the computer department I.T. specialists are effectively surrounded by an alien environment with alien agendas and values. The notion of the organisation as a potentially alien environment however does not necessarily correspond well with the ideal of computer specialists who are responsive to customers and to their market.

2.3.2 Tensions between Organisations & Professionals

The focus in the organisational-professional literature is on staff professionals i.e. those in non-professional (heteronomous) organisations, as this is where tensions and difficulties are mainly seen to lie. More recently, the management of knowledge workers has similarly become of great concern in the literature. In particular, the widely reported divisions between the profession or occupation and the organisation and its representatives, i.e. managers, have been extensively investigated and explained (e.g. Scarbrough 1996; Raelin 1991; Katz 1988).

Clash of Cultures – Managerial vs. Professional Culture

Divisions may be due to professionals and managers self selection and socialisation into different "clashing" cultures (Raelin, 1991). A rather overly caricatured version of these two cultures can be discerned in the literature. However, it functions to highlight the differences between them and show that perceptions of individual value are likely to differ between the two. The managerial culture has commercial goals. It is geared towards performance and efficiency and is characterised as formal, hierarchical, competitive, individualistic (Raelin, 1991), rational, bureaucratic and administrative (Van Maanen & Barley, 1984). In contrast, the professional world is more organic (Scarbrough, 1999), communal and collegial, with shared values, goals and traditions that bond members together (Van Maanen & Barley, 1984). It is wedded to the professional values of self-discipline, peer control and innovation (Scarbrough, 1996). Whereas managers gain authority and power from their hierarchical position, knowledge workers and professionals gain power through membership of occupational-based knowledge communities and their control over technology and knowledge (Scarbrough, 1993; Scarbrough, 1999). One is a culture that values organisational advancement, the other occupational achievement.

Concern over a gap between the I.T. world and the managerial world is reflected in an extensive literature of its own spanning over 30 years (Mumford & Ward, 1968a-b; Taylor-Cumming, 1998). Specifically bridging mechanisms between business and I.T. have been found to be crucial to successful I.T. projects (Earl & Skryme, 1992; Taylor-Cumming, 1998). More generally building understanding between business and I.T. is presented as critical to the success of an organisation (Dalgleish 2000; Grindley 1995). Consequently, the British Computer Society has expounded the value of "hybrid managers" to link the two worlds (Earl & Skryme, 1992; Palmer & Ottley, 1990). Thus business and the organisation have been recognised as important customers of I.T. There is a certain acceptance and willingness to change in order to fully exploit this market. However fusing business/organisational awareness and technical expertise has proved difficult (see Hybrids section 2.4.7).

Within computing, this tension between the managerial and professional world is often characterised in terms of business vs. technical culture. More broadly, it is part of the classic dichotomy between commercial firms and markets and the institutions of science, education and the professions (Scarbrough, 1999). Indeed, Abbott (1998) traces professionalisation in part to the need in the nineteenth century to make "individuals' careers invulnerable to the instabilities of capitalist employment" (132). Thus professionalism grew as a stable alternative to the vagaries of capitalist commercialism. In his historical analysis of professions and professionals, Haber (1991) also describes the disinterested integrity and gentlemanly honour claimed by professions and contrasts this with the self-interest of capital and commercialism.

However, some professionals, including computer professionals, have been largely created within and by organisations (Barley & Tolbert, 1991; Abbott, 1988). They have effectively been born and bred for organisational life and as such possibly should be relatively well adapted for the market orientated, commercial world (Barley & Tolbert, 1991). For instance, engineers have been found to be more business than professionally oriented (Badawy, 1992; Kerr et al, 1977) and Scarbrough (1999) comments that in the US I.T. workers are happy to link their work with business objectives. Therefore, there seems to be some impetus towards greater alignment of the two agendas although there is still a gap.

Organisational vs. Professional Commitment

A second extensive body of literature (Aranya & Ferris, 1983, Mowday et al, 1979, Bartol, 1979) views the conflict between professionals and their organisations as a difference in professional and organisational loyalty and commitment. Much of this

research has its roots in the work of Gouldner (1957, 1958) who identified two organisational roles, cosmopolitans and locals. Cosmopolitan employees identify more strongly with their profession than the organisation. They regard their career as occupational and have marginal loyalty to their employing organisation. Conversely, local employees identify strongly with their organisation, regard their career as being within the organisation and are committed to the organisation and its values. He suggests that organisational professionals, especially those who are more expert, might therefore be more cosmopolitan than local and are therefore particularly likely to experience conflict with the organisation (Gouldner, 1958). He sums up this tension as one between the organisation's need for loyalty and expertise.

Computer specialists appear more cosmopolitan than local as they are accused of showing more commitment to their specialism than to the organisation (Grindley, 1995; Couger, 1996). Also it has been suggested that if there is little chance of organisational promotion or the occupational group is powerful, as could be argued is the case with computer professionals working in non-professional organisations, then individuals are more inclined to choose occupational careers (Van Mannen & Barley, 1984).

Although the distinction between cosmopolitan and local professionals is appealing in its simplicity and surface value it may not be quite so clear-cut in practice. The early literature (Gouldner 1957, 1958; Sorenson & Sorenson, 1974) implies that commitment to either the organisation or the profession results in lack of commitment to the other. However, many researchers have come to the conclusion that that cosmopolitism and localism may be better conceptualised as independent dimensions, some professionals can be committed both to their profession and their organisation or indeed to neither (Baugh & Roberts, 1994; Raelin 1991; Rotundi, 1980).

There seem to be few studies explicitly about the commitment of computer professionals, however engineers are more popular. Contrary to the expectations expressed about computer specialists earlier, studies of staff engineers suggest that most are local in orientation. Possibly, staff engineers and computer specialists may be more local in orientation than those working in engineering or computer companies who might be more cosmopolitan. Yet cosmopolitan and local engineers are both characterised by their emphasis on technical excellence and no consistent difference between the two orientations has been found in regard to other potentially valuable attitudes and behaviour, for example, work values, technical knowledge and commitment to keeping up to date in their field... (Ritti, 1968; Gouldner & Ritti, 1967;

Van Maanen & Barley, 1984). It seems that for staff engineers cosmopolitan and local orientations and organisational and professional commitment may not be such opposites or at least do not manifest themselves in ways that affect the engineer's value.

The link between professional and organisational commitment and value is not clear. Intuitively, it would seem that computer professionals who were more local and more committed to the organisation would also be of more value. However, this may depend on the role that they perform; Raelin (1991) suggests that certain roles may be more appropriately carried out by cosmopolitan employees, although he does not give any examples. Also it may be that neither organisational nor professional commitment is connected to organisational effectiveness (Rotundi, 1980). However, Baugh & Roberts (1994) in their study of engineers found links between both commitments and job performance and satisfaction. Their findings suggest that those computer personnel high on both forms of commitment will have the highest levels of satisfaction and performance and are therefore likely to be the most valued by organisations and within the occupation more generally; whereas, those with low organisational and high professional commitment will have the lowest levels of satisfaction and job performance. Thus high individual value within computing may necessitate some level of organisational commitment. As with hybrid managers mentioned above (also see section 2.4.7), there appears to be some value associated with aligning the organisation and the occupation.

The type of organisation may affect commitment. For instance, those in public organisations may be less satisfied with their work and less committed to their organisations than those working in private organisations (Lachman, 1985). Also those in non-professional organisations may be less committed (Wallace, 1995)

Wallace (1995) also finds that professional and organisational commitment are independent and determined by different factors. The importance an individual places on work and ties with other professionals are significant for professional commitment, whereas organisational commitment is dependent on career advancement and the perceived fairness of organisational reward criteria. Furthermore, she finds that non-professional organisations cannot provide the opportunities for career development that professional organisations can, due to the relatively small size of the professional groups within them. Smaller companies may face similar problems. Wallace also finds that the criteria non-professional organisations use to assess professionals are not as explicit and objective as those used by professional organisations and therefore are not perceived as so valid by the

professionals. Consequently, staff professionals tend to be significantly less committed to their organisation than those working in professional organisations. She also finds that staff professionals lack ties with professional colleagues and instead establish ties with organisational co-workers, which tends to make them less committed to their profession. Also the work of I.T. departments is largely maintenance work, which may be less motivating for I.T. professionals (Couger, 1988).

I.T. departments cannot win – smaller departments may not provide the career and reward opportunities that I.T. professionals want, however larger departments (>200 staff) may have more difficulty motivating staff. Larger I.T. departments tended to be more bureaucratic and offer staff less autonomy. Also staff played more specialist roles that reduced their skill and task variety. In addition levels of management and distance from users in larger departments made feedback less specific and direct and made task significance and contribution to the whole more difficult to discern (Couger, 1988).

These findings coupled with those of Baugh and Roberts suggest that those computer professionals working in I.T. departments will have lower levels of both organisational and professional commitment than those working in computer companies and that their motivation and performance will also be lower. Overall, they may therefore be less valued members of the occupation. In addition Wallace (1995) finds other aspects of non-professional organisations that indicate that their members are less valued members of the occupation: they are paid less; have shorter tenure; less experience outside the organisation; are more likely to be female; are less likely to be from elite schools and believe that they have fewer external job opportunities.

Managerial Control vs. Professional Autonomy

This clash between the two cultures or two commitments can also be viewed as a conflict between managerial control and professional autonomy (Scarbrough, 1996a; Raelin, 1991; Katz, 1988). Uncertain, complex tasks of the sort tackled by professionals and knowledge workers require judgement and therefore autonomy (Scarbrough, 1993; Von Glinow, 1988). However, management is about articulating organisational goals, ensuring that people are working towards those goals and that they are doing so efficiently. Managers therefore want to reduce the indeterminate and open-ended nature of professional work in order to ensure that it complies with organisational resource constraints and organisational goals (Exworthy & Halford, 1999). Management therefore strives to know what I.T. specialists are doing and that

the cost is justifiable in terms of organisational goals. However, the nature of such work is that it is not easily measured and assessed.

Autonomy is central to the notion of professionalism (see Table 2-1). Therefore, more autonomous professionals may be more respected and more valued members of their profession. However, professionals' desire for autonomy and management's desire for control has been found to be particularly problematic for staff professionals (Van Maanen & Barley, 1984). Staff professionals may be less autonomous and again possibly less highly valued members of their profession.

Wallace (1995) makes the distinction between authority – the right to control and evaluate professional work and autonomy – the right of individuals to make decisions about their work tasks. Similarly, Bailyn (1985, 1988) distinguishes between strategic and operational autonomy; strategic autonomy being the ability to set one's own tasks and agenda and operational autonomy being independence in deciding how to actually carry out a task or solve a problem.

Strategic autonomy and authority may be particularly problematic in non-professional organisations where professional independence and control are eroded and subordinated to bureaucratic authority (Wallace, 1995). However, Bailyn (1988) conveniently finds that operational autonomy is more important for scientists and technologists and strategic autonomy is more important for managers. She argues that the problem is not so much a conflict between bureaucratic control and professional autonomy but a misunderstanding about the type of autonomy technical professionals want and need. The solution to any tensions according to this view therefore seems to be that managers and professionals stick within their own areas of expertise and have control within those areas. However, within I.T. this does not accord with the expressed need for hybrid managers and the greater organisation-I.T. integration needed to create more business focused I.T. systems.

Others believe that professionals may be more interested in managerial-type decisions than Bailyn suggests. For instance, professionals may feel that it is for them to evaluate professional work and make decisions about the competence of other professionals (Tolbert & Stern, 1991; Von Glinow, 1988). In fact as Tolbert (1996) points out organisational employment has lead to administrative elites in many professions, i.e. most organisational professionals are under the direct supervision of members of their profession. The distinction between manager and professional is therefore not so clear-cut. Likewise, the separation of the occupation and organisation is also somewhat of a grey area for organisational professionals. The

organisation creates jobs – skills packages – which help define the external labour market and the occupation and organisational supervisors potentially play an important role as gatekeepers of individual value within the occupation (Tolbert, 1996).

Professionals only challenge bureaucratic institutions in areas where professional norms specifically apply (Barley & Tolbert, 1991). However, whether within computing those professional norms are contained simply within technical work or are more widely spread into management and business areas is not clear. Also (as mentioned in section 2.2.4) there is some impetus towards widening computing's jurisdiction so that it overlaps with management and business.

2.3.3 I.T.-Organisational Conflict

Users and I.T. personnel are focused on the different goals and requirements that the organisation places on them and on protecting their own interests (Green, 1989). User groups within the organisation often do not appreciate or understand the worth of I.T. specialists or the value of integrating them into the organisation (Reich & Kaarst-Brown, 1999; Grindley, 1995).

Dalgleish's (2000) case study research shows in more detail this conflict, which often seems to exist between the I.T. function and the organisation. He presents an I.T. department as "a group under siege" (p4) from the pressure and demands of its business customers. The business units wanted to leave everything to do with technology to the I.T. department so that they could get on with what they saw as the more important job of managing the business. They were continually frustrated and disappointed at the performance of the I.T. group and its lack of understanding of the business. Consequently I.T. staff experienced constant criticism from the business concerning their failure to deliver systems and the inadequacy of those systems. They also endured the never-ending demands of the business for I.T. solutions.

The I.T. function seemed to face an impossible task given its resource and technological constraints, the rapid changes in the business which drove the need for new I.T. initiatives and the inexperience of the business people in specifying detailed system requirements. The I.T. staff reacted by trying to withdraw to work that was internal to the I.T. function. This avoided dealing with the business units and the criticism that that entailed. Instead, internal departmental tasks only involved what the I.T. staff considered to be culturally appropriate demands and criticism. There was therefore the danger that this internal work would become the primary task of the

department, that the distance between business and I.T. would widen and that coming full circle, business criticism would be heightened.

Although talking about one particular case Dalgleish's comments are reflected in Grindley's (1995) research with Price Waterhouse, which includes the feedback from thousands of I.T. executives and over 100 organisations. Grindley too comments on I.T.'s perception that they are expected to single-handedly create I.T. solutions without business input. In turn, business people perceive themselves and their work as central and consider that I.T. needs to change to have more business understanding and focus. I.T. personnel are assumed to have all the required knowledge to successful implement systems without bothering business users (Farwell et al 1992) whilst on the other hand business users try to relegate I.T. personnel to technical and service support roles (Green, 1989)

Both business and I.T. seem to want to remain within what they consider to be their proper area i.e. either business or I.T., which makes collaboration problematic. Both need to enter somewhat into the world of the other so that the goals of business and I.T. are in greater alignment (Reich & Kaarst-Brown, 1999). Computing and business seem to have an opportunity to expand their jurisdictions into the other's territory but seem curiously reluctant to do so.

Bento (1996) presents the work of an information centre whose role it was to provide an interface between the I.T. department and the users. The Information Centre was a structurally separate group within the organisation that played the dual role of supporting and responding to users and buffering and shielding the I.T. function from the users. It had to speak the language of both and reconcile their values. Bento comments on the difficulty of setting the information centre's goals and measuring their performance given the two very different agendas of its client groups. The effect of this arrangement was not to lessen or eradicate the conflict but to move it into a unit specifically set up for dealing with the conflict.

Dalgleish's I.T. group also played this interfacing role although for them it was implicit. They were used to resolve differences of opinion between business units that the units themselves had been unable to resolve. Many I.T. projects involved more than one business unit, however, each unit would have different needs and expectations that the I.T. group would have to reconcile before work could begin. Also the I.T. function had to make contentious prioritisation decisions over different business-I.T. initiatives which caused further ill will between business units and the I.T. function. Ironically even if the I.T. function does work for the good of the organisation and the

business as a whole it may still be caught up in the existing conflict between the various groups within the organisation.

The notion that computer professionals are responsive to their customers or to the market implies a single static market and a group of customers that all have similar expectations whereas the market is constantly changing and customers, even within the same organisation, are not necessarily of the same mind. The occupation may respond to major trends in the market but needs to ensure that is not buffeted in all directions by lesser trends.

2.3.4 Managing tensions between I.T. and the Organisation

The management of professionals often either focuses on the vertical division between managers and I.T. workers and how to integrate the computer specialists with the rest of the organisation or the horizontal division between the two groups and the control and containment of I.T. experts by the organisation (Scarbrough, 1993).

The I.T. Function & Decentralisation

In practice, management's attempt at the integration and control of professionals is often structural. Occupational groups are often incorporated within departments in non-professional organisations to ensure that the organisation has continuous access to their specialist knowledge and expertise. This also creates a boundary between the organisation and the expert group, which it is hoped, will preserve the professionals' autonomy and integrity whilst still locating their work within the goals of the wider organisation (Scarbrough, 1996a). Allen (1991) talks of the "enforced localism" (p6) of engineers working in non-professional organisations where the departmental boundary cuts them off from the rest of the organisations and the organisational boundary acts as a barrier to contact with external professional peers. In addition, the organisation encourages adherence to organisational attitudes and goals that can further divide the professional from their occupational community.

However, departments may have their own control and career hierarchies and thus become essentially "mini-professional organisations" (p 230, Wallace, 1995) or "occupationally controlled enclaves" (p10, Barley & Tolbert, 1991) in which professionals retain autonomy and control over their work. Professional enclaves may enable organisations to accomplish tasks for which the organisation is poorly suited (Zuker, 1991; Tolbert & Stern, 1991). Conversely, I.T. departments can form a subculture that reinforces the existing "them and us" attitude (Taylor-Cummings, 1998). Therefore, the exact balance between separating the expert group from the

rest of the organisation, whilst also ensuring that they remain part of the organisation, can be problematic.

One effort at managing computing is to devolve control from centralised to user departments. The intention is to make computing and computer personnel more responsive to user and organisational needs and give business units more responsibility for their own I.T. The implication is that I.T. is now too important to be left to the I.T. department (Skryme, 1996). However, the major problem with the decentralisation of I.T. is the lack of co-ordination and integration of the organisation's systems and the difficulty of implementing organisation-wide I.T. projects. Also decentralisation can lead to loss of economies of scale and a centralised core of I.T. expertise (Grindley, 1995; Scarbrough, 1996).

The focus on integration of I.T. systems generally within the I.T. industry and more specifically within individual user organisations requires centralisation. The shortage of I.T. staff and resources, partially brought about within organisations by the tight controls on the I.T. budget, effectively rations computing. These controls although aimed at curtailing the I.T. function enhance its value through scarcity and cause user department's frustration.

Relating I.T. Costs to Business Benefits

There has been a shift towards a market-based means of regulating expertise. Whereas the professional model allocated expertise at the expert's discretion, it is now increasingly marketed according to customer demand. Also the interaction of expert and user groups now operates through contracts and transactions rather than via hierarchical control (Scarbrough, 1996). This trend can be seen in the way that controls have been exerted on I.T. expertise and the I.T. function. However, like decentralisation, efforts to place financial controls on I.T. have not necessarily curtailed the power of the I.T. function.

As we saw in part1 top management have concerns about the return on their I.T. investment, a lack of confidence in their I.T. dept (Skryme, 1996) and a feeling that computing is out of control (Grindley, 1995). They want to ensure that I.T. costs are tied to business objectives and that their contribution is measured. The costs and benefits of I.T. automation were relatively apparent, however the contribution of I.T. to profits or business advantage are much less tangible and more difficult to assess (Grindley, 1995). Also the insistence on measuring the benefits of I.T. can lead to concentrating on cost saving which means that organisations end up doing the same

thing for less but may restrict the use of I.T. in the process. Thus organisations possibly miss more innovative, beneficial solutions (Grindley, 1995).

One means of measuring I.T.'s contribution is to charge users for services and thus determine its worth according to how much customers are prepared to pay. However, allocating costs to users has proved notoriously difficult (Scarbrough, 1996b; Grindley 1995). Also although charging users may curtail the power of computing, it can be welcomed by the I.T. function. Scarbrough (1996b) points out that it can show that the I.T. function is cost efficient and profitable. As a result, it can be a means of justifying their operation and of selling the function to the rest of the organisation, particularly top management. It may also help to generate revenue for the department and to encourage business units to specify their needs more accurately. Such efforts can therefore strengthen the position of the I.T. function within the organisation particularly if it can be moved from an overhead or cost centre to a profit centre. Outsourcing is another more extreme way of making I.T. users "customers" and I.T. workers "service providers" (Pinnington & Woolcock, 1995). It effectively redefines tensions between I.T. and the organisation and makes them inter-organisational.

At the individual level, monitoring and evaluating professional work is also a problem (Scarbrough 1996a; Barely & Tolbert, 1991; Von Glinow 1988). It can be difficult to define what counts as productivity, let alone measure it (Howard & Lebell, 1989). When criteria are set for professional work, they often rely on the self-management and self-policing of the professionals themselves if they are to be effective (Scarbrough 1996a). Also their results usually need to be interpreted by someone who has an understanding of what is being monitored, hence for instance the need for "player-managers" (Whalley, 1986).

The focus in the literature suggests that the internal boundaries created within the organisation, both structural and social, are often too great and that they need to be broken down (Taylor-Cummings, 1998; Couldwell, 1998; Grindley, 1995; Earl & Skryme, 1992). However, it is largely agreed that some form of occupational community or group is necessary for specialist work (Scarbrough, 1999; Wallace 1995; Spender, 1992; Van Maanen & Barley, 1984) and the organisational boundary itself often means that there is the need for communities that are internal as well as external to the organisation.

2.3.5 Knowledge and Professional Networks

Occupational/professional culture transcends the boundaries of the organisation. However, focusing on the integration and control of occupational members within an organisation makes it easy to ignore the interplay between occupational expertise within the organisation and that of the wider occupation. Furthermore, Scarbrough (1996a) points out that knowledge is located in the group, rather than in the individual; it is embedded in social relations. The challenge faced by organisations thus can be seen to shift from the management of internal structure to the management of external networks and relationships.

The creation and dissemination of specialist knowledge involves sharing cognitive frameworks and developing shared meanings (Scarbrough, 1996 ch9). In turn, this relies on the specialist language and jargon of the expert community and the dissemination and negotiation of meaning via occupational networks linking members (Spender, 1992). However, occupational culture, language and knowledge are dynamic (Van Maanen & Barley, 1984) and thus it is important for members to actively maintain links with their occupation in some form if they are to remain part of the evolving occupation and particularly if they are to maintain their individual value within that occupation. This is especially relevant in computing where the rate of change has been and is great.

A good way to disseminate knowledge is via the inter-organisational movement of employees (Allen, 1991). Likewise at the individual level such movement helps both the individual who moves and others who interact with those mobile individuals to maintain links with their profession and the wider employment environment (Lawrence, 1984). Labour market conditions mean that I.T. professionals are potentially mobile and have the salary incentives to maintain their marketability through inter-organisational moves (Scarbrough, 1996a).

Thus occupational networks provide professionals with a means of keeping up to date with professional knowledge (Scarbrough, 1996; Von Glinow, 1988) and enhance professionals' commitment to their profession (Wallace, 1995). However as mentioned earlier, remaining "networked" may be particularly problematic for staff professionals who are often in relatively small occupational groupings and more in danger of losing contact with their primary industry than those employed in professional organisations; similarly those in small I.T. companies. There is also some evidence that women and minorities have less access to occupational networks and make less use of them (Tolbert, 1996).

Professional networks via individual experts and departments, also help to keep the organisation informed in the specialist area (Scarbrough 1999). They provide pathways for the diffusion of information (e.g. technical information), which might otherwise not penetrate the organisational boundaries (Barley & Tolbert, 1991). Paradoxically it is precisely these professional links, which, as well as providing the organisation with expertise and knowledge, also exposes the organisation to different world views that can conflict with (or support) organisational policies and practices (Van Maanen & Barley, 1984).

Therefore, an organisation that makes use of computer technology does not do so in isolation. It draws on and contributes to a wider network of user and supplier firms Scarbrough (1993). For an organisation to fully exploit computer technology and expertise it must therefore link itself to the socio-economic structures that transmit, perpetuate and legitimate that expertise. It may therefore have to import and accommodate a version of the I.T. occupational culture (Scarbrough, 1993).

In terms of careers and individual value, the employees' pursuit of competence and career within the organisation will be linked with definitions of expertise and career that are legitimised by the wider social setting. Therefore the organisation may need to attend to the career strategies of IS workers by providing what is considered by largely external sources, to be challenging and career enhancing work. The work may have to accommodate expectations for mobility and task variety and enhance the expert's marketability (Scarbrough, 1993; Scarbrough, 1999). The management structure itself may be "infiltrated" by IS expertise and the organisation brought into conflict by the playing out of inter-professional rivalries (Scarbrough, 1993). In return the self-directed career development of I.T. workers can absorb some of the costs and uncertainties of changing I.T. markets and technologies as individual specialists try to keep up to date with these (Scarbrough, 1993).

Computer departments not only provide a way of managing the I.T. resources of organisations they also therefore provide a way of managing the interaction between the organisation and the external I.T. world. The I.T. worker thus becomes a channel between the organisation and the technology supplier (Scarbrough, 1999; Barley, 1996) and their department a shield for the rest of the organisation from this external world. Although a potentially powerful position the I.T. department also takes on the conflict between the two groups and rather than ending up in a position of power often seems to end up in a position of conflict.

2.3.6 How Universal are these Tensions?

From the literature the distinction made between managerial and professional groups within organisations is widespread. It seems that a conflict between managers and professionals is universal and almost inevitable. However, it may be better viewed as a matter of degree (Barley & Tolbert, 1991) particularly if we allow that professionalism itself is matter of degree (Von Glinow, 1988). Also the question of conflict is made more complicated if we allow that members of an occupational group may adapt to organisational life or may be manipulated by the organisation (Van Maanen & Barley, 1984; Raelin 1991). Also for instance, some occupational members (engineers) aspire to supervisory positions within their employing organisation (Gouldner & Ritti, 1967; Van Maanen & Barley 1984).

Experts as Malleable and Adaptable

Whalley's (1986) research found differences in the work orientations of technical employees working in a high-tech and low-tech firm. In the high-tech firm technical expertise was valued for its own sake and many staff had a technical (professional) orientation to their work. In the low-tech firm they had a managerial (organisational) orientation to their work, little interest in technology itself and saw their careers in terms of progression into management. Unlike the high-tech firm, the low-tech firm did not experience the classic problems of expert-management conflict. Whalley concludes that the organisational career and reward distribution of the high-tech firm, whilst serving the aims of the organisation, also helped to create a conflict as it rewarded technical expertise whilst also promoting managerial and organisational values. In contrast, the low-tech firm rewarded organisational loyalty. Therefore, staff computer specialists may be generally less valued members of the profession as they are more likely to work according to organisational than occupational criteria. Also far from the conflict between occupation and profession being a clash of cultures or intrinsic orientations it may be at least partly created by managerial strategies (Scarbrough, 1996a).

Similarly, Scarbrough (1996b) finds that the aspirations of I.T. groups are malleable and closely related to the collective identity that the groups construct for themselves. Wallace (1995) argues that professionals may both adapt their workplace to fit their professional needs (e.g. making departments mimic professional structures) and adapt their professional values so that they are consistent with organisational goals. A profession may not have one single fixed notion of professionalism but may have a number of "setting-specific professional ideologies" (Wallace, p237), which are grounded in a general underlying notion of what it means to be member of that

profession. Computer companies and computer departments may therefore create different conceptions of what individual value is.

I.T. professionals may therefore actively seek to exploit tasks to enhance their own standing. However, they are not simply free to indulge their professional/technical values at the expense of organisations and management. Rather they have to survive in a labour market dominated by the interests of employers and decide upon which skills to invest in, according to information on organisational rewards and from the labour market. Expertise is not therefore separate from the organisation but is partially created by it (Scarbrough, 1996). In turn, organisations have to live with the skills that exist at any particular moment in time.

The Division as the Outcome of Organisational Strategy

The apparent clash between managers and professionals may therefore be an outcome of organisational strategy. This does not negate the problem but redefines it in a different, hopefully clearer and more useful light.

Galbraith (1984) points out that organisations often face two incompatible goals: that of pursuing the traditional business and that of discovering and developing new business. Hence, in Whalley's high-tech firms technical specialists were encouraged to be innovative but were also required to produce results for the organisation. The specialist thus experienced a tension, a tension whose creation and continued stress can be traced to management policies and the organisation that they represent. Scarbrough (1996a) and Barley & Tolbert (1991) also frame the relationship between the organisation and the profession in terms that echo these incompatible goals of innovation and stability.

It may not be a matter of breaking down barriers between professionals and management, as this just relocates the problem, rather than resolving the conflict, it maybe a matter of managing it (Scarbrough, 1996a; Scarbrough, 1999). Scarbrough (1996a, 1999) locates the managerial-expert conflict within the competing strategic objectives of innovation (i.e. creating knowledge) and efficiency (i.e. applying knowledge). He argues that there is an inherent conflict within knowledge work between the openness and networking implied in the acquisition of knowledge (e.g. developing and sustaining relationships with external technology suppliers and peers) and the closure (e.g. discretion, definition and completion) implied in the exploitation of that knowledge for economic return. He sums this up as a conflict between "knowing" as part of work experience and "knowledge" as a commodity.

Barley & Tolbert (1991) suggests that bureaucratic forms of organisation focus on efficiency and that professional forms focus on effectiveness. Further they suggest that professional forms of organisation may moderate the inherent weaknesses in bureaucratic institutions and that therefore the relationship between the two may be mutually beneficial. However, they may still clash.

Thus the organisation wants a stable and efficient environment but also needs to be innovative and effective. Stability and efficiency lead to a focus on results, closure and a short-term perspective, the latter to an innovative, longer-term perspective viewing the future with potential. If the professionals are involved in the second of these aims (innovation and effectiveness) then they are likely to experience a conflict between the changes that they want to bring and the stability and efficiency that the organisation also wants. Computer specialists, particularly more recently, have become involved in creating innovative and effective systems rather than merely more efficient ways of preserving the same processes (automation). Those working in computer departments are obviously particularly closely involved in this.

Scarbrough (1999) suggests that the organisation is seeking to externalise many of the conflicts created by knowledge work and accelerated industrial change. At the individual level, this can be seen in the weakening of ties between the organisation and its employees. For the individual expert the conflict between innovation and efficiency can be seen in the dilemma between long run skills development and short-term rewards. Employees are handed over the problem of redundant skills. Knowledge workers are given responsibility and risk for their own skills development and are hired on the basis of need.

A slightly less theoretical but related view sees the gap between business and I.T. as a misalignment of responsibility and power (Grindley, 1995). Computing is regarded by users and I.T. personnel alike as a support function. It shelters behind this view as a defence against its escalating costs and to avoid responsibility for achieving benefits. Business users are responsible for meeting business objectives but depend on I.T. to achieve their objectives. Business also expects some explicit indication that it is receiving value for money from I.T. Grindley comments that this expectation is inappropriate as the value of a support function comes from the use that others make of it and that anyway many of I.T.'s benefits are intangible. The responsibility for business-I.T. results thus falls between these two disjoint views. The I.T. function has power and responsibility for the systems that do the work but not for the benefits they are supposed to bring. The I.T. director possibly should be where this power and

responsibility come together however, only 7% of I.T. directors admitted to being responsible for a payoff from their organisation's I.T. investment (Grindley, 1995).

Again, there appears to be this middle ground that needs filling between the organisation and I.T. Separating out and containing I.T. therefore will not help. Organisational strategies mean that the I.T. function is an area of tension and that these tensions need to be recognised and managed. Unfortunately, though tensions are often not explicitly recognised, the I.T. function is left to contain them and as a location of these conflicts it is also the implied cause of them.

2.3.7 Conclusion to Part 3 – The Organisational Context

The relationship between the organisation and occupation is a complex one. The organisation plays a substantial role in creating perceptions of individual value within the computing occupation and as an employer of computer specialists obviously has a stake in those perceptions. However, the organisation's definitions of value may conflict with those of the occupation. In section 2.2 computing was shown to be a type of knowledge work where customer awareness and market responsiveness are important. However, in this section we see that at the organisational level the computing occupation may be at odds with its market.

The organisational context for the computing occupation can be divided into two types of organisation: computer companies that are in the commercial computing business and user organisations whose main business is not computing but who employ computer specialists within computer departments. Between these two types of organisations, there may be variations in what is considered a valuable computer person. The computer company may have expectations and employ computer specialists in areas that are congruent with computing as a subject area and occupation. Conversely user organisations may be at odds with the computing occupation as their agenda and focus is within a different area and computing is a tool rather than of central concern.

Tensions between the organisation and the occupation can be viewed in different ways: as a clash between the technical-professional culture of computing and the managerial culture of the organisation, as a difference between the organisation and those cosmopolitan computer specialists who are geared towards their profession and its values and goals rather than those of their employing organisation or as a conflict between management's desire for control and computer professionals' desire for autonomy. More recently, these tensions have been viewed as an inevitable

outcome of certain conflicting managerial strategies (e.g. innovation vs. stability; effectiveness vs. efficiency; long-term vs. short-term).

A solution to managing the tensions between the organisation and the profession could be for managers and computer professionals to stick to their own areas of work. I.T. departments help provide this separation. However, and paradoxically, this partitioning can heighten tensions and lead to a "them and us" situation arising between different departmental groups. There is thus a need to get the balance right between the separation and the integration of professionals within organisations.

Commitment and value to the profession and to the organisation may not be completely at odds; those professionals that are highly committed to both may be the most valued members of their profession. Conversely, those that are uncommitted to their organisation but highly committed to their profession may paradoxically be the least valued members of their profession. Not only might there be an overlap between individual value within the computer occupation and the organisation but value within the organisation may be necessary for value within the occupation.

The current tension between the computing occupation and organisations may be related to the change from automation to more integral and strategic organisational computer use. Just as the technology is becoming embedded and integrated into the organisation's work, so the relationship between the occupation and the rest of the organisation needs to become much closer. This could be an opportunity for jurisdictional expansion. The computer occupation is attempting to be customer focused and responsive to its market. However, its market is diverse, may have conflicting agendas and is not static.

Computer companies may be more likely than user organisations to have career and reward systems that fit with those of the occupation and the expectations of computer specialists. Conversely, user organisations, because of the relatively small size of their I.T. functions, are likely to have fewer opportunities for career advancement. They are also likely to use organisational rather than occupational criteria for the distribution of rewards. Their reward systems are therefore more likely to be perceived by computer specialists to be unfair and somewhat arbitrary. Staff computer professionals therefore may be less likely to be committed to their employing organisation than those working for computer companies.

Staff computer specialists are likely to be somewhat cut off from the wider computer occupation. They are working within organisations that are part of other industries and are therefore surrounded by a "foreign" agenda. They may therefore be less

committed and less valued members of their profession than those working within computer companies (Wallace, 1995). Computer professionals within computer companies may be more committed to both their profession and organisation.

However, professionals may adapt to organisational life and may be manipulated by it. They may adopt different orientations in different organisational settings or at different times in their career. Setting-specific professional ideologies may exist, whereby professional values are adapted to different organisational settings and likewise professionals may adapt their workplace to fit their professional needs.

It is important for both computer specialists and their employing organisation that they remain connected to the wider occupation outside the organisation. This relationship enables the occupational members to keep up to date and the organisation, via this relationship, to be kept informed. Inter-organisational movement of computer specialists can help with this transference of knowledge between occupational members and organisations. Professional links between organisational members and the wider occupation thus provide the organisation with the expertise and knowledge that it seeks whilst also exposing it to different occupational cultures and possible conflicts. Consequently, if an organisation is to *fully* exploit computer technology it needs to accommodate the career and role expectations of computer specialists and their culture, i.e. it must provide an appropriate setting for computer professionals to "live" in. Departmental computer workers in particular become a channel between the I.T. world and the organisational world but in doing so become enmeshed in the conflicts and differences between the two worlds. The problem thus becomes more a matter of managing boundaries between the organisation and occupation both internally and externally rather than simply positioning those boundaries correctly.

The relationship between the organisation and the occupation is largely ignored in the literature, which is strange given that it is central in to most people's working lives (Barely & Tolbert 1991; Van Maanen & Barley, 1984). My research, whilst not specifically focused on investigating this interplay, is investigating individual value within an occupation that is very much organisationally based and as such may throw some light on this area. Also research has tended to focus on professionals in non-professional organisations. This study incorporates different organisational contexts: organisations that are small, large, professional and non-professional. With particular relevance to my study, it may be that value is defined differently in different "types" of organisations, or that people may be distinguished as valued by dint of their organisational membership. An occupational career and individual value may not just be forged through an organisation or through different organisations but also via

membership of different types of organisations. What is clear is that individual value within computing is affected by organisational membership.

This section has highlighted the deeply ingrained belief in the culture gap between I.T. and "business" within the organisation and the importance placed on managing and closing that gap. The next section looks at the skills and attitudes that are valued within I.T. and shows that at the individual level this division is played out in the difficulties of fusing I.T. awareness and business skills. Subsequently, in the section on careers, it can be seen in the way careers are viewed as organisational or occupational, managerial or professional and hierarchical or lateral. The assumption that the organisation and the profession are at odds is thus played out at different levels.

2.4 SKILLS & ATTRIBUTES

As this research is investigating perceptions of the computer profession and of the skills and attributes of valued computer professionals, it is important to look at what sort of people they are perceived to be, and specifically what and who is valued and what counts as value and why.

2.4.1 Skills shortages & Recruitment Difficulties

Over the past 25 years the story of the I.T. occupation has been one dominated by skills shortages, high turnover and costly staff along with successive government initiatives to increase I.T. awareness and expertise (IMS 1980; Connor (Buchan) & Pearson 1986 & 1989; Crepeau et al 1992; Dench, 1998; Caine et al 2001). Skills shortages are of particular governmental concern as I.T. is viewed as essential for the economic success of both individual businesses and countries. In the UK, the demand for I.T. products and services has grown rapidly amid concerns that the lack of I.T. skills are constraining its development and application (Bednar & Bissett, 2001; Connor, Buchan & Pearson 1989).

Connor et al (1986, 1989) depict an industry desperate for experienced people. In particular, they found a lack of people with 5+ years experience and of those who combined technical with business and interpersonal skills. Due to the shortage of experienced people a third of recruits were new or recent graduates. Also Dench (1998) found that the majority of I.T. recruits were either graduates or experienced people. Organisations were reluctant to take on older inexperienced people and preferred to buy in skills rather than develop them. This reflects a more general reluctance in I.T. for long-term H.R. planning and staff development (Couger, 1996; Skryme, 1996; Connor et al 1986 & 1989).

The lack of people with adequate skills means that many firms outsource work to service firms (Pinnington & Woolcock, 1995; Connor et al 1986 & 1989). This relocates the problem of recruitment and skills updating to other organisations. In the UK there appears to be an increasing trend towards I.T. outsourcing and a move towards non-I.T. organisations only keeping a small core of I.T. staff (Pinnington & Woolcock, 1995; Kirkpatrick, 1991). Also Western companies are outsourcing certain software development tasks to developing countries such as India where manpower is available and relatively inexpensive (Bhatnager & Madon, 1997).

2.4.2 Computing Culture and the Stereotypical Computer Person

The stereotype of computer specialists derives from the first computer personnel who were mathematicians and engineers and is therefore closely linked to that of the stereotypical technical personality. Hacker (1981) describes such techie young men who are unconcerned about their physical and social selves. They identify themselves with machines; are interested in finding out how things work; enjoy ordering the world around them and value rationality and control. They place great importance on technical expertise and ridicule technical incompetence. This description matches that of the computer boffins described by Turkle (1988, 1984) and the compulsive programmers described by Weizenbaum (1984). Turkle (1984) describes the "computer hackers" retreat into a world where they were absorbed by the complexities of the computer and used it to create systems that increasingly challenged their understanding and control.

Although those computer professionals who match this extreme "techie" image may be in a minority they create an image of computing which is pervasive (Turkle 1984; Rassmussen & Hapnes 1991). The typical machine fixated computer scientist is an embodiment of society's separation of people into those who are good with machines and those who are good with people. They help to construct a culture around computing which emphasises technological rationality at the expense of more human values.

This culture has been likened to that of young male adolescents playing computer and video games (Kiesler, Sproull & Eccles 1995). It invokes "us-and-them" distinctions: "they" were considered "smart" and "competent" but "strange" and "difficult to talk to" (p44, Sproull, Kiesler and Zubrow, 1984). The lone computer boffin may be especially difficult for women to identify with as women value connection to others and find separation from others threatening (Gilligan, 1993). In addition computing belongs to a world where there are no shades of meaning and only one way of doing things, which may also be problematic for women (Turkle, 1988; Bailyn, 1987). The stereotype and distinction between computer personnel and others is intensified by computer personnel's renowned inability or unwillingness to communicate with others in terms that can be readily understood. This helps to limit others' knowledge of computers and creates a mystique around computing and computer personnel, which gives them power and status (Goldsworthy 1996; Lloyd & Newell 1985).

This techie culture also has implications for systems design. Technical people tend to look at technical problems as more or less interesting rather than judge them

according to their importance for the organisation (Couldwell, 1998). Thus users and experts may have different views of the purpose of computer systems, for instance techies may want a state of the art computer system that they can continually "improve" while the users want a reliable, stable tool (Turkle, 1984).

Brackley (1996) in her article about hybrids says the "I.T. specialist's stereotype has successfully made the transition from unworldly boffin to professional practitioner" (p86). She seems overly optimistic. The introduction of the microcomputer in the mid-1980s may have blurred the distinction between computer experts and users. Also computer professionals seem to be more user-friendly. Thus the differences between computer professionals and others may be lessening and the boffin-type image may be becoming more legendary than real, however it still seems to exist and its effects still exist.

2.4.3 Profile of Computer Professionals

In accordance with the stereotype, computer professionals are predominantly young and male. Rises in the average age of computer professionals are mainly due to the aging of the workforce rather than the industry taking on older new recruits. It seems that to start a career as an I.T. professional you must be young (Connor, et al 1986 & 1989).

Personality

Myers Briggs personality profiles of computer staff show them to be more intuitive, introvert, and somewhat more thinking and judging than the general population. The dominant psychological types identified all preferred working alone. This research also suggests that I.T. staff prefer well-defined goals, are ready to assume responsibility, show perseverance and value task/project completion (Lyons, 1985). They also have higher growth needs and needs for achievement than workers in general (Couger, 1988; Woodruff, 1980). Holland's (1992) classification of occupations according to personality type includes computer operators and computer programmers. His analysis of these two computing jobs also shows computer professionals to be introvert and liking of structure and logic – Figure 2-3. Similarly, Woodruff (1980) finds that I.T. staff have significantly higher need for autonomy and cognitive structure and lower need for change than people in general. These findings may suggest that computer personnel have a lower tolerance for ambiguity than most (Baroudi, 1985).

Figure 2-3: Holland's personality types of computer operators (ICR) & programmers (IRE)

- **Investigative** = interested in concepts, logic and abstract problem solving.
- **Logical** = critical and cautious. Place a low emphasis on human relations and tackle problems in rational, impersonal ways.
- **Realistic** = like to be involved in practical activities. May not be interested in social interactions and expressing feelings.
- **Conventional** = emphasis on organisation and planning. Likes structured environments. Value security and dependability. Enjoy clarity and being in control, not imaginative.

Ironically, ambiguity, change and social skills are inherent features of much computer work. Rapid technological changes are part of the industry. Often computing jobs involve spanning organisational and departmental boundaries and interacting with a number of different types of individuals. Considerable interpersonal interaction is required to balance the vague and frequently conflicting desires of different user groups. Given the personalities of computer personnel, these boundary-spanning activities may be difficult for them and result in role conflict and ambiguity (Baroudi, 1985). Similarly, Whitaker, (1997) finds that the ambiguity of their role is frequently de-motivating for software developers. However, rather than personality he associates this with the short-term view often taken by organisations and their lack of an overall I.T. strategy. Whether through personality or organisational faults I.T. personnel may find themselves in positions which are too ambiguous for them.

Other studies (Green 1989; Couger 1988; Couger & Zawacki 1980) also conclude that I.T. managers and personnel are introverts with low social affiliation needs and relatively poor communication skills. Couger (1988) points out that given these findings it is not surprising that computing projects often have ill-defined requirements and fail to meet user needs. Likewise, Skryme (1996) concludes that the introvert nature of computer personnel is why some of the more successful hybrid managers come from non-I.T. backgrounds. However, Ferratt & Short (1988) argue that these results may be less to do with personality and more to do with the conditioning of people's behaviour according to their working environment. The findings of McLean et al (1991) also support this. Ferratt & Short suggest that changes in others expectations of I.T. people are likely to lead to a different type of person being attracted into I.T.

I.T. jobs may no longer fit with the personalities of I.T. personnel. In the past when computer professionals worked more in the background the heavily introvert person with poor communication skills, who liked structure, certainty and well-defined goals may have been more appropriate. However, more recently, there is the need for

hybrid staff who are more extrovert and who can network and communicate (Earl, 1996). They may also need to be more adaptable and tolerant of ambiguity.

Work Expectations

There is a broad consensus in the literature about the work needs and expectations of computer specialists (See Table 2-3). Briefly, the work itself is a top motivating factor and central source of job satisfaction for computer personnel. In keeping with the personality profile given above they want work that gives them a chance to use their skills, is challenging and gives them a sense of accomplishment. They also want recognition and opportunities for promotion. They value opportunities for professional development and training and the chance to work with the latest technology. In spite of Ferratt & Short's (1988) findings, mentioned previously, contact with others did not seem to be important.

Table 2-3: What computer professionals want from their work

Opportunity to use their skills	Garden 1990; Mumford 1972
Interesting work	Garden 1992 & 1990
Creative work	McLean et al 1991
Challenging work	McLean et al 1991; Garden 1992 & 1990; Von Glinow 1988; Mumford & Ward 1968
A sense of accomplishment	Mclean et al 1991; Couger 1990
Recognition and praise from others	Sanker et al 1991; Garden 1990; Couger, 1990; Green 1989; Von Glinow, 1988; Mumford 1972;
Gain satisfaction from task completion	Mumford 1972; Mumford & Ward 1968
Like clearly defined stages en route	Whitaker 1987; Mumford 1972
Like Task and skill variety	McLean et al 1991; Garden 1990; Mumford 1972
A certain amount of autonomy & independence	McLean et al 1991; Von Glinow 1988; Mumford 1972
Value opportunities for professional development and training	Roberts & Biddle 1994; Garden 1992 & 1990; Green 1989; Von Glinow 1988; Campbell 1983; Mumford 1972
Work with the latest technology	McLean et al 1991; Mumford & Ward 1968
Opportunities for promotion	Garden 1992; McLean et al 1991; Couger, 1990; Green 1989; Mumford 1972

Computer professionals focus on the work itself rather than the organisational environment. They are inclined to leave companies that do not provide career opportunities for increasing and updating their specialist knowledge and skills (Garden 1992; Von Glinow 1988). Promotion may be expected in the form of increased technical responsibility and challenging work but for many others there is the aspiration of moving into management (Garden 1990). They value recognition and praise but may find them difficult to achieve as they and users may have different expectations of the role of I.T. professionals (Green, 1989). Also the desire for

promotion is likely to be a key area of dissatisfaction for computer professionals (Pemberton & Herriot 1993); particularly with recent trends in downsizing and flatter organisations. However, the modern day world of work and careers is supposed to be less about hierarchical moves.

2.4.4 Gender

As well as government interest in the shortage of I.T. skills generally there has also been much concern about the lack of girls and women studying and working in computing. Women are seen as a great untapped resource, who could help solve the problem of skills shortages. Hence the Women into Science and Engineering (WISE) and Women into I.T. (WI.T.) government initiatives (Bendar & Bissett, 2001) and the more recent Women into Computing (WiC) organisation (Lander & Adam, 1997).

Computing can be viewed as masculine in terms of numbers - who studies it, who teaches it and who is considered a computer professional. It can also be considered masculine in terms of how people perceive it, its image and in terms of its subject matter, its values, its relationship to other subjects, and its culture (Sarage & Griffiths, 1981; Byrne, 1993). Computing, along with for instance engineering and physics, is linked with true, objective knowledge (Adams, 2000).

Numbers and Location of Women in Computing

The proportion of women computer professionals is low compared to men. The British labour force survey statistics for 2000 give 21% of programmers and systems analysts as female (EOC, 2001). Also the career opportunities for women are reported to be fewer and not so attractive, leading to more women than men leaving the profession (Wright, 1997). Similarly the proportion of women studying computer science at British universities is low, particularly considering the increase in the number of women entering higher education (HMSO 1995) and the increase in the proportion of women studying subjects such as physics, chemistry and engineering (Adam, 2000). See Figure 2-4 for details.

Figure 2-4: Percentage of women in computing

Percentage of computer professionals who are women		
1985	15-20% (Connor & Pearson, 1986).	
1988	25%	(Connor et al, 1989)
1993	19%	(Bednar & Bissett, 2001; Kavanagh, 2002)
2001	20-25%	(Bednar & Bissett, 2001; Kavanagh, 2002)
Women make up 45% of the British labour force (EOC,2000)		
Percentage of computing undergraduates who are women.		
1977	25%	(Keller, 2002; Newton, 1991)
1987	10%	(Keller, 2002; Newton, 1991).
1998/99	17%	(EOC, 2001).
Women make up just over half of university undergraduates (EOC, 2001).		
Percentage of women members of professional computing organisations		
13%	British Computer Society	(Bednar & Bissett, 2001)
31%	Institute for the Management of IS	(Bednar & Bissett, 2001)

It seems that even when women do enter the computing industry, they have less influence and are concentrated in lower status and lower paid jobs than men: most management jobs are done by men; most data preparation jobs by women; more women are programmers than are in the more prestigious role of systems analyst (Bednar & Bissett, 2001; Newton 1991; Lockheed 1985). The dual attachment of masculinity both to technology and to management makes computing a difficult field for women (Adam, 2000), particularly as male managers tend to favour others like themselves (Kavanagh 2000).

Women's Interests In Computing

Societal and educational factors may create a view of computing that is not of interest to women (Newton, 1991; Lloyd & Newell, 1985); however, some women do study computing and are computer professionals. Research has shown that their interests may differ from those supported by the dominant masculine culture. They place greater emphasis on working with others than their male colleagues (Wienreich-Haste & Newton, 1983; Bailyn, 1987; Horten, 1991). They also have a strong need for relevance, are interested in computer applications and in computers as tools (Clarke & Teague, 1996; Rassmussen & Hapnes, 1991; Turkle, 1988, 1984; Lockheed, 1985; Griffiths 1988). Consequently, women as well as being employed in lower status jobs are concentrated in certain types of roles. They are more likely than men to be systems trainers and to work in service support roles and are less likely to work in hardware, network architecture and project management (Hammond, 1992). Thus there appears to be both horizontal and vertical gender segregation in computing.

Similarly, women have preferences for computing courses linked to business administration rather than those situated within the mathematics and science

departments and tend to choose "softer" options to do with the human side of technology and the uses of technology in society (Kvande & Rasmussen, 1989). However, traditionally computer science courses focus on the machine itself rather than on the machine as a tool.

Computing systems may suffer because of this gender imbalance within the industry (Bednar & Bissett, 2001). Women may have a much broader view of what constitutes a good technical solution including considerations of the user, organisation and work environment. Incorporating more feminine interests into computing may therefore result in more user-friendly technology that is better suited to the needs of the user and organisation (Kvande & Rasmussen, 1989).

However, according to Kavanagh (2002) women cannot win in the computing job stakes no matter how skilled they are. He reports on research showing that the social and technical skills of computer professionals are viewed differently according to whether they are held by men or women. Men with social skills were regarded as having great social acumen while women were seen as 'nice'. This "niceness" of women was considered "not enough" and was associated with less intelligence and less technical ability. Social skills were overlooked in women because it was expected of them, whereas social skills in men were less expected and therefore when present were much more visible. Similarly, techie men were described as wizards and clever, whereas techie women were viewed as boring.

There is a strong connection between technology and masculinity and a related incompatibility between femininity and technical competence (Cockburn, 1991; Bailyn, 1987). Those women who carry out technical work and opt for a technical career have been found to be significantly less confident about their work than technically orientated men or women who have opted for a managerial career. Indeed, for women, lack of self-confidence was correlated with the importance they attached to developing technical expertise (Bailyn, 1987).

The computer, when reduced to the level of a machine or separated from the world of people by being classed as technology, is therefore alienating for women. Women may be interested in a different type of computing that stresses human values and computers as tools. Women may opt for certain areas within the industry, but by doing so they help to define these areas as feminine and as soft, and by keeping away from other areas help to define them as masculine and higher status. However, it seems that more traditionally female interests and concerns are now needed within computing.

2.4.5 Computing Education

Although computer science is a relatively practical degree subject, there appears to be a gap between the computing taught at university and the computing skills employers require. Consequently, a computing degree is not required for many graduate I.T. jobs; recruiters are more interested in the class of degree, which they regard as a measure of general intellectual ability (Dench, 1998; Kavanagh, 1997; Connor, Buchan & Pearson, 1989). The graduates recruited do tend to be from numerate disciplines although employers may be placing a growing emphasis on personal qualities (Connor, Buchan & Pearson, 1989; Kavanagh, 1997). The graduates that are in demand are those who have combined business and computing or developed the interpersonal skills needed in the "real world" (Skryme, 1996).

The appropriate content of computing courses has received a great deal of attention and has been the subject of debate for some time. Courses need to develop graduates' communication and team working skills and equip them with a business/commercial perspective (Clarke & Teague, 1996; Farewell, 1992; Cougar 1988; Mumford 1972). Instead, courses are criticised for attracting those with a technical bent and reinforcing their existing values (Pemberton & Herriot, 1993; Kvande & Rassmussen, 1989). They focus on the computer itself rather than the application of computers. It is argued that computing needs to be broadened to becomes more "useful" and interdisciplinary (Dench 1998; Dahlbom & Mathiassen, 1997; Hartmanis, 1992; Denning, 1992).

As well as these extra skills that courses perhaps should include, the technical content of degree courses is also a matter for discussion. The useful lifespan of skills taught on vocational degrees is four years (Watts et al, 1992), probably less in computing. The pace of technological change means that specific technical skills have a short useful lifetime and universities often seem to be left behind teaching and working with old technologies (Kavanagh, 1997). It can be argued that the purpose of education is not to equip people for the world of work, however, 95% of Universities thought that their courses were providing employers with what they wanted (Kavanagh, 1997).

The debate over the content of computing degrees reflects the shifting relationship between computing and other academic disciplines and wider expectations of what computing should be about. Parnas (1990) is concerned that although computer scientists are engineers their education only prepares them to be technicians. He proposes a more "classical" computing education to include courses in science, maths and engineering. Dijkstra (1989) sees the proper location of computing not so

much in the area of engineering as in the direction of mathematics and applied logic, where formal proof that a program meets the formal functional specification can be given.

A seemingly more realistic view is provided by van Emden (1989) who in a reply to Dijkstra argues that formally specifying and proving programs correct does not solve the main problem with software which is firstly deciding what you want the computer to do. He comments that creating a program that meets a specification often results in the realisation that we did not want the system to work exactly as specified anyway. In another reply, Winograd (1989) argues against Dijkstra's narrow view of computing and computer science. He points out that computers do not just manipulate symbols, as Dijkstra remarks, but produce paychecks. He concludes that programmers should create systems that function appropriately in the real world, rather than formal proofs and specifications.

The fundamental argument of both Parnas and Dijkstra concerns the lack of rigour in computer science, compared to "harder" disciplines. However, computing may necessarily lack rigour if it is to be flexible and useful. Denning (1992), takes a more pragmatic view of computing education than Parnas and Dijkstra. He comments that universities do not educate graduates to succeed within today's "new" organisations and shifting, global market place. In an argument that echoes the idea of a shift from mode1 to mode2 knowledge outlined in section 2.1.1, he suggests that traditional computing education is too fact and rule based and relies too much on precise models and procedures. He maintains that the modern world is too complex and changes too fast to allow the full reflection that computing specialists prefer before action. He argues that there is a second kind of knowledge that can only be gained from involvement and collaboration with others. It is contextualised, practical and active and includes competence in listening, persuading, learning and being trustworthy and honest. Both kinds of knowledge he says are essential for "computer engineers."

Similalry, Dahlbom & Mathiasson (1997) call for a redefinition of technical competence. They explain that when computers were used to automate tasks their power was their independence from people, now their dependence on people is their power – they enhance people's action and interactions. They argue that now that technology is interwoven into every day life, social skills and context must be interwoven with the discipline; a new computing curriculum should define the subject area in terms of the way computers are used.

The degree of codification (see section 2.2.3) of occupations depends on the ability of group members to develop a dominant paradigm, which in turn rests on internal consensus about standards of education and training (Tolbert, 1996). Certain academic disciplines, such as maths and physics, have achieved this convergence, focus and self-regulation and thus have more status and power than other disciplines that are more divergent and externally influenced (Beecher, 1989). Thus, computing, whilst establishing itself as a distinct discipline, may gain status and power from its continued links with electrical engineering and mathematics. Also certain skills, such as interpersonal skills, are widely distributed in the population and therefore do not help codify the occupation (Tolbert, 1996) and therefore may not be valued. However, I.T. seems to be coming under increasing pressure to move closer to business, and business and management seem to be becoming more codified and powerful. Managers, once a very organisation specific group, are becoming "professionalized" by gaining qualifications and developing portable skills (Exworthy & Halford, 1999; Kanter, 1993). Hard pure disciplines may be losing power in a context that is shifting towards mode2 knowledge and more fluid, post-modernist ways of thinking. But also it may be that more fluid areas are becoming more codified.

2.4.6 Computing Skills and Expertise

Much research on computer employees' specific skills and expertise focuses on programmers and systems analysts. Whilst the basic dimensions of the two jobs have been found to be the same, analysts' jobs are higher status and have been distinguished from those of programmers by involving more communications skills and personal contact (Vitalari, 1985; Arvey & Hoyle, 1974). Also greater communication skills and organisational knowledge differentiated a good systems analyst from a poor analyst, with poor performers more likely to describe their jobs in purely technical terms (Vitalari, 1985).

More recent studies show similar results. Domm et al (1990) found that what most differentiated technical professionals from managers were not their technical or intellectual abilities but their motivation, company loyalty and ability to get on with others. Basically, managers valued those who fitted with the organisation and work-group. Interpersonal skills help people fit in (McLean et al 1991). Lee (1994) found that high performance engineers were more integrated into the organization, had more contacts outside their department and were better able to network with the appropriate people according to the task's requirements than lower rated engineers who tended to have more local interactions. Thus again it is not technical expertise

that distinguishes a more highly valued worker from a less valued worker but organisational and people skills.

These two sets of skills, technical vs. people, have come to symbolise the differences between programmers and analysts to the detriment of the programmers' careers and development opportunities (Brooke 1995). A further distinction between the two jobs is made by Kraft (1979) who, following Taylor's division of labour, sees programmers' and analysts' roles as dividing into a hand/head division of tasks: the more intellectual and cognitive task of designing computer systems being separated from the more routine and manual task of coding the design. Thus programming is devalued by conceptualisation and the production of symbolic goods being divided from actual performance and the production of material goods.

However computer professionals see themselves others have their own expectations. Green (1989) found that analysts placed more importance on their own diplomacy, political and persuasion skills than users did. Users felt that the analysts' technical skills were of much greater importance than the analysts themselves did. Likewise, Brooke (1995) argues that essentially, the programmer is portrayed as a machine person, who is system oriented, an introvert and a bad communicator. In contrast the systems analyst is depicted as a people person, user oriented, extrovert and a good communicator. Programmers, Brooke claims, have become trapped by their characterisation as the stereotypical computer person whereas systems analysts have managed to escape this narrow role. She shows how these stereotypes produced in the literature are reproduced by way of company recruitment, training and development practices and job descriptions. Research and management thus conspire to create a self-fulfilling prophecy whereby programmers become techies and analysts become more valued members of the profession.

Thus the technical aptitude and technical experience of I.T. professionals are often overemphasised by both themselves and others (Keen, 1988). For many computing jobs, the sort of person needed appears not to be the technical boffin. Rather there is the need for people with softer, interpersonal skills (Skryme, 1996), not least because of the increased number of technical support and training roles (Hammond, 1992).

It is argued that computer personnel also need a stronger business/customer orientation (Broadbent, 1992; Couger, 1988). They must be able to relate technology to business needs and goals, particularly if they want to be valued and attract greater financial and career rewards (Pemberton & Herriot, 1993). However, as I have said, computer personnel are continuously criticised for their narrow technical focus and

lack of appreciation of wider human and organisational issues (Goldsworthy, 1996; Clegg, 1993; Horten, 1991; Mumford & Ward, 1968).

Consequently, I.T. managers are increasingly required to be business people rather than technologists (Broadbent, 1992; Couger, 1988). IS executives have started to play a broader, more strategic role and newer executives are likely to have had experience of managing a non-IS function (Grindley,1995; Applegate & Elam, 1992; Alter, 1990). This concern with making IS managers business managers reflects the importance given to aligning I.T. with business strategy (Reich & Kaarst-Brown, 1999; Skryme, 1996; Broadbent, 1992). However, it is not only IS executives who have failed to appreciate business requirements but also senior management who have failed to appreciate the benefits of I.T. (Earl & Skryme, 1992). A key conclusion of the "MI.T. management in the 90s programme" was that non-I.T. managers needed to understand the implications of I.T. for business strategy (Scott Morton, 1991).

"For the next decade, the main problems concerning telecommunications and computers will relate to people not technology" (p 254, Keen, 1988). Keen appears to have been right. Human and organisational, rather than technical factors, are believed to be a major source of computing project failures and given that 80-90% of UK I.T. investments fail to meet their objectives in full and 50% are abandoned completely, this is particularly disturbing (Brackley, 1996). These "people problems" largely relate to the lack of understanding and communication between business and I.T.: I.T. people who are not regarded as part of the business; imprecise corporate I.T. objectives, users lack of appreciation and knowledge of I.T. and vice versa; and the intangible nature of I.T. benefits (Grindley, 1995). Hybrid computer personnel are one possible answer.

2.4.7 Hybrids - Valuable I.T. People?

Keen (1988) first suggests the usefulness of the hybrid role that IS professionals could perform and the term hybrid manager was later coined by Michael Earl (1989). Hybrid managers help facilitate the integration needed between business and I.T. (Earl and Skryme, 1992). They can perform this intermediary or interfacing role between the organisation and the I.T. industry that was shown to be needed in section 2.3 of this literature review. They effectively act as translators between the technical and business world (Couldwell, 1998).

Hybrid managers can apparently make a significant contribution to the organisation's success (Skryme 1996; Palmer & Ottley, 1990) and at the very least there is evidence to suggest that they help I.T. projects meet expectations in terms of time, budget and

user needs (Brackley, 1996; Earl & Skryme, 1992; Earl, 1989). The interest and recognition given to hybrids by the British Computer Society (BCS) (Palmer & Ottley, 1990) and the Council for European Professional Informatics Societies (CEPIS) shows the seriousness with which such claims have been met and the importance that hybrid managers have been accorded (Couldwell, 1998; Brackley, 1996).

What are hybrids?

The BCS note that information use and management have become of strategic importance and make a case for computer professionals becoming more strategic as well (Palmer & Ottley, 1990). They draw parallels between the movement that accountants have made into business positions of influence and the repositioning that they are proposing for hybrid computer personnel (Palmer & Ottley, 1990). However, as a professional body it is maybe not surprising that they are arguing for more central, powerful positions and rewarding new career paths for I.T. professionals.

A problem with more traditional, techie-type computer personnel, is that specific, detailed technical knowledge is only valuable for a short time (Hartog & Rouse, 1987). More valuable is a broad awareness of computing and the I.T. industry as this gives an understanding of the possibilities and limitations of existing and new technologies (Earl & Skryme, 1992). Hybrids are thus aware of I.T.'s potential for their organisation, they help to specify business needs in terms of I.T. requirements and play a crucial role in delivering and managing the changes required (Couldwell, 1998; Earl & Skryme, 1992; Palmer & Ottley, 1990).

A full description of the competencies of hybrid managers is given in Figure 2-5, but in brief they combine business understanding, technical skills, interpersonal abilities, managerial skills, and organisational knowledge. As for more personal characteristics, hybrids have a strong personal commitment and energy (see Figure 2-6).

Figure 2-5: Competencies of Hybrid Managers

- They **know the firm's business** and industry and thus can spot opportunities within it.
- They have **organisation specific knowledge**. They have an understanding of the organisation's culture, politics, structure and processes. They know the people within the organisation well and know how to get things done within the organisation.
- They possess **general management skills**. They have change management skills, the ability to get things done, decision making and analysis skills, good judgement and the ability to see the big picture.
- They have **excellent group and interpersonal skills** – the ability to communicate, motivate, listen, negotiate and persuade. The ability to build a team and develop good working relations with other.
- They have **knowledge of I.T. fundamentals**, methods, applications and suppliers. They can recognise I.T. opportunities and have the confidence to ask and challenge. They understand the capabilities of I.T. They have project management skills, know what needs doing and are able to appreciate the scope and size of projects.

(Earl & Skryme, 1992; Skryme, 1996).

Figure 2-6: Personal characteristics of Hybrids

- High calibre people.
- Strong self motivation and liking of challenge.
- Energy and enthusiasm.
- Curiosity.
- Conceptual skills.
- Flexible.
- Able to cope with ambiguity and conflict.
- Sociable and have a wide social network.
- Persistence drive & commitment.
- Strong commercial sense.

(Palmer, 1990; Palmer & Ottley, 1990; Skryme 1996)

Earl & Skryme (1992) stress that organisation specific knowledge is crucial for a successful hybrid. Consequently, managers external to the organisation, who do not understand the organisation's culture or its processes, will face "insurmountable obstacles" (p175). Also valuable are management skills or project management experience as hybrids need to be able to manage technical people and translate for them business objectives (Couldwell, 1998; Earl & Skryme, 1992). More specifically hybrids need managerial competencies e.g. interpersonal, political, team working, financial and analytical skills. Hybrids also need the ability to work both with broad concepts and at a very detailed level (Couldwell, 1998).

Hybrids might come from the I.T. side being project leaders, systems analysts or systems managers or they might come from the business side being self sufficient end users; line or functional managers (Earl & Skryme, 1992). Since the identification of hybrid managers, others have pointed out the importance of hybrid I.T. personnel generally (Palmer 1990; Palmer & Ottley, 1990). Indeed it may be more useful to talk in terms of creating hybrid teams rather than hybrid individuals (Earl & Skryme, 1992).

Developing Hybrids

The BCS concludes that part-time MBAs are an excellent route for I.T. specialists to broaden themselves and to acquire hybrid skills (Palmer 1990; Palmer & Ottely, 1990). Alternatively people could come straight from MBA programmes into IS (Earl & Skryme, 1992; Kerr, 1989). However, MBA courses in the UK have been criticised for lacking "good hybrid content" (p446, Skryme, 1996). Information management often comes second to other topics and when addressed is treated as discrete, rather than being interwoven into the teaching (Skryme, 1996). This separation does nothing to smooth out the boundaries between I.T. and business, rather it reinforces them.

To develop shared I.T.-business knowledge the organisation needs to show some commitment to cross-departmental interactions via multi-disciplinary project team or job rotations and secondments (Reich & Kaarst-Brown, 1999; Couldwell, 1998; Skryme, 1996). However, many experts emphasise that this is more than a matter of token job rotations on short-term assignments. People need to spend some time within different parts of the organisation doing real jobs that require real commitment and responsibility (Palmer 1990; Earl 1989; Keen 1988). However, Keen (1988) warns that if I.T. people are left for too long in business roles then their career ambiguity may be too great. The main route for I.T. people to develop into hybrids is as consultants to business units (Earl & Skryme, 1992; Skryme, 1996) or via project management (Reich & Kaarst-Brown, 1999).

People could also move from business units into the I.T. function (Skryme, 1996; Keen, 1988). In fact, Earl & Skryme (1992) imply that hybrids may be better derived from business managers who acquire I.T. experience, although, as they point out, the BCS (Palmer 1990; Palmer & Ottley 1990) not surprisingly emphasises the alternative route.

Business skills and organisational knowledge are cumulative and are best developed through time spent in the same or related industry and with significant time in each job and within their current organisation (Keen, 1988; Kotter, 1982). Hybrids are therefore likely to be "corporate citizens" whose attitudes and views fit with those of the organisation, who have been with the organisation for a length of time and feel commitment and belonging towards the organisation (Earl & Skryme, 1992; Palmer, 1990). Reich & Kaarst-Brown's (1999) found that I.T. professionals who successfully make the transition into non-I.T. jobs had greater allegiance to the organisation than to their profession. However, this "company man" is reported to be a "rapidly dying species" (p350, Rosenbaum & Rafiullan Miller, 1996). Also I.T. managers often only

stay in one job and organisation for a few years and having spent years honing their technical skills can find acquiring business knowledge difficult (Earl & Skryme, 1992; Keen, 1988).

Schein's management career anchor may be the most relevant for hybrid managers (Earl & Skryme, 1992). However, Schein (1996) observes that such people are fundamentally different to those who are highly technical orientated. Hybrids should ideally be extroverts with good social skills (Couldwell, 1998) and the aptitude to move into different parts of the organisation. Therefore, the low social affiliation needs of I.T. professionals may also be a problem. Earl & Skryme (1992) point out that the career orientations and personality of IS people may mean that they have a lack of interest in becoming hybrids.

However, Palmer suggests that I.T. specialists are actually often frustrated about being stuck in the I.T. function and unable to move into other parts of the organisation. Consequently I.T. departments with hybridisation schemes have been found to have lower labour turnover as their best people are continually challenged. Also because they are seen as more interesting places to work, the hiring yield and quality of new hires may be better (Palmer, 1990; Palmer & Ottley, 1990. Although I.T. professionals may gain from the career development and job satisfaction of hybridisation, they also risk failure and gain uncertainty. They face the choice of maintaining their technical skills or developing business and organisational skills and may find that they end up belonging to neither the business nor the I.T. world (Palmer & Ottely, 1990; Keen, 1988).

The idea of Hybrids is not unique to the computing profession (Watts et al, 1992; Exworthy & Halford, 1999). In a reiteration of the I.T.-hybrid research, Watts et al (1992) report that in addition to their professional skills professionals in general need managerial skills, including business, interpersonal and cross functional skills; they need to be business people as well as professionals; they need commercial understanding and awareness. These, Watts et al suggest can be gained from repeated involvement in a wide range of business situations. Thus whilst I.T. may present a particular set of problems, this move towards hybridisation is part of a wider move which affirms the importance of business.

2.4.8 Changes to Computing Expertise

Computing professionals have come under a lot of criticism and a lot of pressure to change. The following shows two ways of viewing the pressures and changes that have taken place in the professional identity and expertise of computer professionals.

Professional Identity - From Mechanistic Enthusiast to Pragmatic Romantic

The history of computing is said to polarise between two basic attitudes to progress: the enthusiasts and the pragmatists (Grindley, 1995). The enthusiasts are like the stereotypical computer person and are interested in the computer as a machine. On the other hand, the pragmatists are concerned with the computer as a tool and its use. Grindley argues that the first 3 decades in computing were driven by the enthusiasts but that since the mid-1980s business backlash (see section 2.1.2) the pragmatists have taken control.

Similarly, the professional identity of computer professionals can be viewed in two competing ways: the mechanistic and the romantic. The mechanistic view like that of the enthusiasts focuses on the machine. It is based on science, truth and logic. It is rational, believes in planning, analysis, structures and systems. On the other hand, the romantic focuses on people and how they think, interact and view the world. It is interested in the process of change and the tensions that bring about that change. Within computing, this philosophy, like pragmatism, leads to a focus on the development and use of technology rather than the technology itself (Dahlbom & Mathiassen, 1997)

What counts as individual value within computing obviously depends on the evaluator's expectations of the profession. Dahlbom & Mathiassen use the mechanistic and romantic views to outline three competing conceptions of the computing profession – see Table 2-4. The first focuses on the machine and the construction of technologies to increase efficiency; the second on the computer as a tool to help people be effective and the third, the computer as an instrument of change and the appropriateness of its use.

Table 2-4: Conceptions of the Computing Profession

I.T. professionals as people who...	...build things	...help people	...change things
Focus:	The **Computer / Technology** and its technical functionality.	**Culture** – Adapting computers so that they are useful to individuals and organisations.	**Power** – moral and political impact i.e. when and how to use computers
Jobs:	Technicians, engineers & programmers	Trainers, advisors and user support staff	Managers and consultants
Approach:	A **rational approach** is taken to construct a technical solution to a well-defined problem.	**Evolution** – an experimental approach is taken to allow for uncertainty.	**Intervention** – they change a problematic situation by using computer technology
Role:	**Engineer** - Interested in developing better technologies to increase efficiency	**Facilitator** - Increasing the competence of clients and users. Understanding how technology can be used to serve people.	**Emancipator** – Using technology to advance society / organisations and protect people from its oppressive use.

The first approach corresponds to a mechanistic way of thinking and is that "traditionally" held by computer professionals. Dahlbom & Mathiassen argue that the world is changing and that computer professionals also need to change so that they become closer to the romantic in the third column. These changes in the role of the professional mirror the way that computers have evolved from automating machines to user's tools to integrating information technologies.

Professional Practice from Treatment to Diagnosis and Inference

The development of the computing expertise can also be investigated through Abbott's (1988) theory of professional knowledge in use. He suggests that professional practice can be viewed as consisting of three activities: diagnosis, inference and treatment – see Figure 2-7.

Figure 2-7: Abbott's Professional Activities

Diagnosis - getting information from the client, removing extraneous information and classifying the problem according to the profession's knowledge system.
Inference - using the profession's knowledge to reason about the diagnosed problem. Too little inference the profession becomes in danger of being routinised, however, too much can make it appear esoteric and its reasoning difficult to justify.
Treatment - tackling a problem and producing results for the client. Whereas diagnosis involves getting information from the client and removing extraneous individual properties, treatment involves reintroducing individual properties to make the treatment fit the client.

Not all professions get involved in all three activities or in all three activities to the same extent. Also although the activities may seem to flow logically from 1-3, this is not necessarily the case.

Diagnosis - Computing can be classified as an information profession and as such could be regarded as having expertise in diagnosing which information is relevant to a problem's solution (Abbott, 1988). However, when computers were being used to automate tasks, diagnosis was fairly straightforward: the systems to be replaced were relatively simple and the diagnosis of what information was relevant had essentially already been made. With newer systems computer professionals seemed to take a similar approach. They expected the user to know what the system should do and to give them much of the information and thus perform most of the diagnosis. The user was therefore required to come to the computer professional and "meet" them at their professional boundary. Computer professionals were also very restrictive about what information was important. They were only interested in the technological aspect of the problem and excluded business, social and organisational factors. Their diagnosis in effect centred on the technology.

Today computer professionals have moved much closer to being experts in diagnosis. One of the profession's major tasks now is to meet with clients and work with them to decide what systems they want. This ideally involves computer professionals meeting the clients on the client's own ground. Thus a much wider range of information is now considered relevant.

Inference - Similarly computer professionals used their technological knowledge to reason about the diagnosed problem. Inference was thus restricted to reasoning about the problem in relation to firstly the hardware and later the software. Increased

pressure to justify themselves and their systems led to "scientific" methods to develop better-engineered systems. More recently contextual factors have been more fully taken into account.

Treatment - This has probably been the computer profession's main task domain. Automation was essentially taking a diagnosed problem and applying a different treatment to it, which resulted in faster, more efficient or effective results. The treatment was mysterious to the client and thus was accepted. As clients became increasingly intolerant of the underperformance of computer systems and progressively more knowledgeable about treatment via computer systems, computer professionals came under mounting pressure to speak the client's language, explain their systems and ensure the quality of their systems.

Computer professionals are now required to be much less technology orientated and "self centred." They have moved from applying treatment with little user consultation to a position where their work is more client-centred. These changes can be viewed as an effort to maintain or defend the occupation's jurisdiction. The demand for improved computer systems and the need for someone to engage with the client have opened up possibilities of jurisdictional attack by others. There are opportunities for someone to act as *middleman* between the technologist and the client. Computer professionals are trying to fill this role. They have moved from being very treatment orientated to being much more involved in diagnosis and inference to the point at which these areas are arguably more valued parts of their work.

2.4.9 Conclusion to Part 4 – Skills and Attributes

Computing skills are believed to help organisations and economies succeed and are therefore valued. However, the computing industry is renowned for its skills shortages and the resultant recruitment difficulties, high salaries and staff turnover. The demand for computing technologies and likewise personnel has rapidly increased, out pacing the supply of computing skills, which due to their scarcity have become even more valued.

The picture of exactly who these computer professionals are and what skills they have that are so valued is however unclear. That is not to say that there is not a lot of consensus on what computer professionals are like. At the extreme, they are withdrawn from others, interested in computers as machines and absorbed by finding out and controlling how the computer works. More generally, they are often young

and male. They are rational and logical. They are introverts with possibly low social needs and skills. They want to achieve, they show perseverance and are motivated by task completion. They like structure and well-defined processes and goals. However, these characteristics may make them inflexible and intolerant of ambiguity and uncertainty. Changes in the role of computer experts and in the wider world of work make these characteristics inappropriate and the lack of interpersonal skills and inflexibility particularly damning. Thus, although apparently valued, the focus in the literature is often on what computer professionals lack rather than on what skills and competencies they have.

The techieness of computer personnel often makes others feel alienated. A "them and us" situation arises in which they are odd, we are normal and they need to change and become more normal. This division is exacerbated by computing's association with objective, scientific and rational ways of thinking and its links to other areas such as engineering, physics and maths, which also tend to distance others.

Women seem to find computing particularly alienating. Many fewer women than men study and work in computing, and those that do tend to be located within limited areas. Thus computing becomes identified as masculine and is placed in opposition to femininity and to softer more feminine skills and attributes, e.g. people skills, flexibility and a view of the world involving various shades of meaning. Whereas a more masculine computing profession is interested in machines and technology, a more feminine computing profession is interested in people and tools. It would seem that it is just this feminine influence that computing needs. However, women computer professionals, as well as being fewer, tend to be in lower status, less well paid roles than men.

The seeming inconsistency of computing skills being valued and yet heavily criticised can be seen in debates on computing as an academic discipline. Some people argue that computing should be more rigorous and scientific and thus more closely match the pattern of, for instance, mathematics or engineering. Others argue that computing is too technically preoccupied and needs to place greater emphasis on interpersonal and team working skills and developing a business/commercial perspective.

In spite of opinions that computing is not "scientific" enough, it seems that the world has changed leaving behind the computer techie. Whereas once computer personnel were considered odd, they were also in the background carrying out useful tasks and could be ignored. Now they are no longer in the background and their oddness is a hindrance. Those computer professionals who have remained closer to the techie

image appear less valued and those who have developed organisational, people and business skills appear more valued. As well as being viewed as masculine vs. feminine, this can also be viewed as a conventional hand-head division of tasks whereby cognitive, managerial-style skills are valued more than manual, machine-orientated, technical skills.

Organisations have become more dependent on computers as they have become increasingly integrated into many different organisational functions. Computer personnel also need to integrate themselves into the organisation. They need to be able to communicate to other organisational members about topics that are important to the organisation and its business.

Hybrid personnel have been touted as the answer. They succeed in having technical skills whilst avoiding being a techie, alienating others and marginalising themselves. They have organisational knowledge, interpersonal skills and an understanding of business. Hybrids act as intermediaries and translators between the two worlds of I.T. and the organisation/business. They blur the boundaries between these two worlds by studying for MBAs, joining multidisciplinary project teams, acting as consultants and taking up secondments in user departments.

Although the literature and the BCS focus on the I.T.-Hybrid, hybrids could also come from other areas. The emphasis is on criticising I.T. professionals for not being more business orientated, however business people also appear to be deficient. They tend to treat I.T. as a support function rather than part of the business; they do not appreciate the business benefits of I.T.; and form imprecise specifications for I.T. systems. Indeed, it may be that the work environment, organisational policies and the narrow expectations of others straightjacket I.T. personnel into being techies (Brooke, 1995; Ferratt & Short, 1988; Green, 1989).

It is this ability to defy expectations that make I.T.-hybrids valuable. They appear to have sets of skills that are often considered incompatible. They carry out a boundary-spanning role that makes their position somewhat ill-defined and precarious. As go-betweens, they risk not belonging to the business or I.T. worlds, with their skills not good enough to be valued in either. It is this combination of skills that are defined as opposites; their ability to accept the ill definition and uncertainty of their role and the risk entailed which makes them rare and valuable. However in a telling statement about hybrids, Brackley (1996) comments that "amongst the attributes that make them remarkable was their ability *to look and act* just like other managers in their organisation, whilst at the same time understanding about I.T." (P86). It may be, that

although I.T. hybrids are infiltrating the wider organisation and business world, they are still really regarded as techies who, though good actors, are still somewhat deficient.

Nevertheless, computer professionals have changed from mechanistic enthusiasts to pragmatic romantics. Likewise, the work of the profession has changed from being very treatment orientated to being more involved in diagnosis and inference. This gives computer professionals a wider, more important, role but one which others are more likely to be critical of and to challenge.

2.5 CAREERS

The value of a computer professional may not just be about the skills that they have but the development of those skills over time. In other words there may also be value associated with an individual's career. This part of the literature review looks at the distinction between the subjective and objective career. It shows that the objective and subjective career can be viewed as quite closely related. It also looks at recent careers research on boundaryless careers. The boundaryless career fits well with the notions of dynamic, rapidly changing environments and knowledge workers. More traditional careers research is also relevant, in particular Schein's career anchors and dual-ladder careers.

2.5.1 The Subjective and Objective career

As Goffman (1961) points out "one value of the concept of career is its two-sidedness" (p127). This two sidedness concerns a distinction between the subjective (internal) and objective (external) views of a career (Stebbins, 1970; Collin & Young, 1986; Barley, 1989). The objective career is the observed progress and the subjective career is the individual's perspective. The objective career is thus public and related to official positions within an organisational structure, job titles, formal status and salary changes, whereas the subjective career signals an individual's personal experiences, feelings attitudes and self-conceptions.

It has been argued that within careers research too much emphasis is placed on the objective career and that more recognition should be given to the significance of the subjective career (Collin 1986). This seems to be particularly so with the recent interest in more boundaryless careers, which by definition rely on the interpretations of the career actor rather than outside frameworks such as organisations (Weick, 1996; Arthur, 1994; Barley, 1989). However, there is little research into either the subjective or objective careers of I.T. people. Also the labelling and distinction between subjective and objective careers is somewhat misleading given that both are socially constructed and dialectically related (Weick & Berlinger, 1989; Collin 1998), one necessarily informing the construction of the other.

Even with the current emphasis on the subjective career, career is still a social phenomenon. People need some external reference points to act as markers of progress even if those markers are less publicly visible and more informal than traditional organisational career paths (Ellig & Thatchenkery, 1996; Weick, 1996; Tolbert, 1996; Barley, 1989). Thus individuals co-construct their careers (Collin &

Young, 2000) and arrive at inter-subjective definitions and understandings of what it means to be an "X" and what counts as career advancement (Ellig & Thatchenkery, 1996). People's career options are limited by the collectives, or "occupational communities", to which they belong. These reference groups provide career actors with templates of the career paths available, with signals about career progress and with a means of making sense of their roles (Barley, 1989). Thus career is defined in terms of members perceived and created boundaries. The occupational community creates a pattern to the sequence of roles and jobs within a career and it is this pattern that makes a career a career, rather than just a job history (Van Maanen & Barley, 1984).

Weick & Berlinger (1989) suggest that within traditional, more bureaucratic organisations, the objective structures the subjective career. However, in certain types of organisations, which are particularly flexible and suited to rapidly changing environments, the subjective career may help to define the objective career. In such situations, the organisation does not provide career paths; rather individuals are encouraged to develop in ways that add value to the organisation. These acts of individual movement and development help to create structure and definition within the organisation as individuals and groups experience this movement and become related in different ways. Thus the typical view that organisations create careers is reversed so that careers become creators of structure and process within organisations (Weick, 1996). Weick & Berlinger assume that the subjective career, by its nature, incorporates growth, skill development and cumulative learning and point out that high technology areas, containing for instance computer companies, are likely to contain these more adaptive organisations where the subjective career takes the lead.

Although the objective career is often used to denote the consensual and observable path through an organisation, it can also be used to look at possible career paths within an occupation. However, within computing the objective career is not easily observed and understood: careers are inter-organisational, job titles are not universal and the occupation is fast changing and does not appear to have any hard and fast career structures built in. The objective career within computing appears to be informed by subjective views and personal development. This thesis investigates I.T. manager's perceptions of what a career in computing is and should be. It seems useful to investigate the patterning that makes a computing career what it is, both to illuminate computing as an occupation and because it is suggested within the boundaryless careers literature that as organisations become less important in

defining career pathways, occupations will become more important (Tolbert 1996). In addition, this research is interested in the development of value within the I.T. profession, which implies some possibility of social recognition or inter-subjective agreement although not a completely fixed and defined notion of value.

2.5.2 Boundaryless careers

Hall (1976) introduces the notion of a protean career, which takes its name from the Greek myth of Proteus who could change his shape and form at will but found it difficult to stay in any one form. The protean career values action and motion because they involve change; success is represented by moving and movement in the search for self-fulfilment, rather than salary, position or title. This protean career has been recast more recently as the boundaryless career (Arthur & Rousseau, 1996). In the protean or boundaryless career it is the person rather than the organisation who owns and manages their career. Thus there are possibilities for greater individual freedom but also for greater individual responsibility and self-reliance. As Arthur & Rousseau (1996) comment, people have greater freedom to act and fewer rules to act by.

Kanter (1993) describes the traditional career: in the traditional career organisational professionals progressed by movement up a long career ladder within a single function and a usual sequence of job moves. Career movement was thus linear and vertical. There was a long process of development and many job moves between entry-level management and those making the key business decisions. General management responsibilities were taken on fairly late in the career, loyalty was prized and turnover and job-hopping were unacceptable. Ellig & Thatchenkery, (1996) argue that this type of career fitted with the industrial era. However, today they point out knowledge workers and tacit, subjective and changeable knowledge are important. Consequently, centralised control needs to give way to market forces, which they propose are far superior at combining autonomous decisions and communicating information. Thus autonomous individuals are relied on to develop their abilities and find new ways create value; the profit that they earn from successfully doing this provides them with incentives to continue to be entrepreneurial.

The boundaryless career thus sees a shift away from external guidelines, to internally generated guides such as increases in competence, growth, and learning (Weick, 1996). Consequently, individualistic rates and ways of development are the rule rather than objective, normative career stages and paths (Collin, 1998). The

subjective career therefore particularly comes to the fore in the boundaryless career (Arthur, 1994; Ellig & Thatchenkery, 1996). However, as we saw above, this does not necessarily mean career anarchy; people still need ways of understanding and bringing coherence to their world and of fitting in. There are still likely to be some moves and decisions that are considered more acceptable and more valuable than others. Thus as traditional career scripts become less suitable guides, people create patterns which give them a sense of continuity and in turn create new career scripts (Gunz et al 2000; Weick, 1996). New boundaries are likely to emerge from career actors strivings to make sense of their place in the world (Tolbert, 1996).

Even in one of the most prototypical of boundaryless careers, that of the Silicon Valley computer worker, there is still the geographical and industrial boundary constraining the engineers' movements. Indeed the concept of boundarylessness in career often means that a person's career is not constrained by organisational boundaries and may favour occupational boundaries (Gunz et al, 2000; Collin & Young, 2000; Tolbert, 1996; Defillippi & Arthur, 1996; Kanter, 1993). Working within a specific industry context provides speed of integration and the relevant know-how associated with products, customers and technologies, which are important abilities for organisations (Gunz et al, 2000). Career and personal continuity can thus come from work identities that are more like those of professionals whose core beliefs; values and skills are not organisation specific (Weick, 1996).

Not only is career in a boundaryless world not constrained by the organisation, it is also not bound to an organisational type hierarchy. Lateral career moves become increasingly acceptable and normal (Kanter, 1993). However, this does not necessarily mean the end of hierarchical careers; rather it is that these hierarchies are no longer organisation based (Weick, 1996). As Weick (1996) points out, implicit in any form of organising is differentiation and thus the potential for advancement, plateauing and descent. In the boundaryless career people develop a personal reputation and employability; they shift their loyalty from the organisation to themselves (Kanter, 1993). Career advancement in a less bounded world is about learning and being able to fit into different organisations in ways that add value (Weick, 1996; Defillippi & Arthur, 1996). Careers of advancement are giving way to careers of achievement (Zabusky & Barley, 1996). Careers are no longer about performing tasks and dividing people into "hands" and "heads", rather people start to understand their careers in terms of the results that they achieve by applying themselves within a particular context, thus many people need to be using their heads (Ellig & Thatchenkery, 1996).

Learning is therefore central to boundaryless careers (Defillippi & Arthur, 1996). It provides a source of continuity but is itself a process that builds on continuity and is therefore dependent on it (Weick, 1996). A boundaryless career is a process of continual change whereby people develop their abilities and learn about themselves and the opportunities available to them via exploration and discovery (Ellig & Thatchenkery, 1996). Careers are no longer about a progression of work experiences per se but about the information and knowledge created as a result of those work experiences (Bird, 1996). Careers thus become repositories of knowledge (Bird, 1994) as people build up a portfolio of skills and experience (Defillippi & Arthur, 1996). Boundaryless careers also provide for inter-firm collective learning (Saxenian, 1996). Saxenian (1996) finds that unlike computer workers in Silicon Valley, those on Boston's route 128 were constrained by a culture in which organisational boundaries were defended and job-hopping was considered unacceptable. She argues that route 128 firms were deprived of the inter-firm collective learning of Silicon Valley, which in turn led the computer manufacturer Hewlett-Packard, based in Silicon Valley, outgrowing DEC, based on route 128.

The labour market plays an increasingly important role in the boundaryless career. The labour market is an arena for exchange in which price and quality judgements of skills by sellers and buyers are central (Gunz et al, 2000; Defillippi & Arthur, 1996). Within such a model career boundaries can be viewed as labour market imperfections created by the reluctance of selectors to allow certain kinds of people to make given moves and the reluctance of career actors to move into certain kinds of jobs (Gunz, 2000). It is important that both buyers and sellers are able to evaluate and send out signals within this market. There is therefore a need for a common language of value where effective signals of career attainment and past achievements can be credited to workers and recognised by organisations (Rosenbaum & Miller, 1996). As mentioned in section 2.2.3, occupations and occupational membership provide one way of codifying, abstracting and commodifying knowledge and signalling competence and judging skills (Tolbert, 1996).

Within boundaryless careers, people need to be more self-reliant and become responsible for their own future employability (Parker & Arthur, 2000; Kanter, 1993). The fact that careers are less constrained by organisational boundaries means that people need to be constantly learning and developing their human capital wanted by the market place (Kanter, 1993). Individual employees become responsible for evaluating the market potential of their current competencies and for investing in new transferable competencies (Defillippi & Arthur, 1996). Indeed there seem to be

growing trends in occupational skill standardisation and credentialing (Defillippi & Arthur, 1996; Kanter 1993). The technical skills and knowledge of computer professionals provide them with these transferable skills.

Boundaryless careers may seem novel, however it has been pointed out that conventional career moves have not necessarily always been the norm (Nicholson & West, 1989; Tolbert, 1996), and that boundaryless careers are not new (Gunz et al 2000). It is also not clear that a real change in the world of work is taking place, indeed firms still seem concerned to attract, retain and ensure the rapid progress of high flyers (Guest & McKenzie-Davey, 1996) and go to great lengths to avoid the costs and uncertainties involved in losing employees (Gunz et al, 2000). Research has shown that the traditional organisation and the traditional hierarchical career are alive and well (Storey, 2000; Guest & McKenzie-Davey, 1996). Further Guest & McKenzie-Davey (1996) suggest that some careers in more rapidly changing sectors are not so much in this liberated state of boundarylessness but in "a state of chaos" (p23).

Alternatively, the linear, future orientated view of career may be seen as a product of its time (Collin & Young, 2000). Today's world is more uncertain, employment mobility is greater (Arthur & Rousseau, 1996) and organisations need to be adaptable and innovative in order to fit in with an increasingly competitive and changing environment (Defillippi & Arthur, 1996). Changes to organisational structure and the rise in knowledge work are key developments that have made the career less bounded (Arthur 1994). Boundaryless careers may not be new or intrinsically valuable, their importance depends on their relevance within today's context (Defillippi & Arthur, 1996).

The boundaryless career is said to make sense for both the individual and the employer, providing the flexibility and learning that is now required within the new economic era (Arthur, 1994). In particular modern service and technology organisations are knowledge based and rely on employee self development and constantly renewed skills for their survival (Defillippi & Arthur, 1996; Macaulay & Harding, 1996). The boundaryless career also fits in with wider notions of boundarylessness and freedom that is encapsulated in free markets and globalisation. It is also often associated with individual freedom and empowerment and corresponds particularly well with the US culture of individualism, self–reliance and hard work. However, there are also social costs, some people are likely to lose out in a boundaryless world and have limited growth opportunities and limited freedom (Hirsch & Shanley, 1996).

2.5.3 Career Anchors

A person's career may therefore be less constrained by organisational boundaries; the ultimate boundary however is that of the self. Schein (1993) recognises the importance of self-knowledge in guiding a person's career. This knowledge leads people to become increasingly conscious of their occupational strengths and weaknesses, goals and values. Schein introduces the concept of a "career anchor" to describe the integration of these areas of self-knowledge. He explains that a career anchor is that part of a person's self-concept that comes to dominate their career decisions and becomes of central importance in guiding their career; it is those values and motives that the person will not give it up. From his longitudinal research, which began in the early 1960s, he identifies eight distinct career anchors (see Table 2-5). According to Schein each person has one dominant career anchor which remains the same throughout their career.

Table 2-5: Schein's (1993) Career Anchors

Technical / functional	To develop and use particular skills and expertise, to use their expertise in challenging tasks and be rewarded for their expertise and do not want to be promoted into general management. They value recognition from their peers
Autonomy / Independence	Need to do things in one's own way to one's own standards, rather than adhere to informal or formal rules. They value portable skills and more autonomy.
Pure Challenge	The desire to overcome seemingly impossible odds or solve difficult problems. The level of the challenge is more important than its nature.
Security / stability	Security of tenure and stability of location. The person values safety, security and a predictable future. They value good pay and pension provision.
General managerial	Ambitious – want promotion, status, income and responsibility. They have analytical skills, interpersonal competence and emotional resilience. They avoid specialisation.
Entrepreneurial / Creativity	Motivated to create new organisations, products or services which can be clearly linked to their efforts. Income and profitability signal the success of their efforts. They tend to become bored easily and seek the limelight.
Dedication to a cause / service	Enter work that upholds values that are important to them. The chance to contribute to such an organisation's mission is motivating.
Life Style	Concerned with integrating self, family etc with careers. They want flexibility to achieve this within the employment arrangement.

Schein (1996) explains that there are people with a variety of anchors in every occupation. Therefore, those in management do not necessarily predominantly have managerial career anchors nor do those in technical work predominantly have a technical career anchor. However, the technical career anchor is of the most obvious relevance to I.T. It describes well the traditional technical employee, outlined in section 2.4.

A seemingly technical orientation is normal at the start of many careers but does not mean that people are anchored to their functional area; their specialist area may be a means to other ends (Schein, 1993). Feldman & Bolino (1996) use the concept of careers within careers to show how career anchor theory may work over time. They explain that work experiences highlight and crystallise a person's abilities, needs and values into a stable career anchor or identity, the person then seeks to enact that identity according to their present work and career situation. Therefore, I.T. professionals may start their careers without a clear career anchor and only later try to enact their stable anchor. However, some anchors may be more difficult to enact than others within the occupation.

Crepeau et al (1992) use Schien's five original anchors to investigate the career orientations of I.T. people. Of the three missing anchors, challenge and service are somewhat included under their broader definition of the managerial[1] anchor; however, the lifestyle anchor is completely omitted. Of the five anchors that they use, they identified three as dominant for I.T. employees: management, technical and stability. A later study found that I.T. professionals had four main career anchors: managerial, technical, autonomy and lifestyle (Igbaria et al, 1997). The two studies seem to have contradictory findings over autonomy and stability. However, Crepeau et al's (1992) sample consisted of I.T. professionals employed in departments within large bureaucratic, often government organisations, hence the importance given to stability and the lack of significance given to autonomy may be due to their sample. Igbaria's sample also consisted of departmental employees but they worked within a variety of different types of organisation. In neither study were creative / entrepreneurial roles of relevance to I.T. people. The two studies agree on the prevalence of technical and managerial anchors amongst I.T. professionals. Given a more traditional hierarchical organisation-based career, a dual-ladder approach may therefore be an effective strategy for I.T. career management

Technical career anchors may become more problematic in an increasingly dynamic world as people with this anchor are likely to worry about obsolescence and will need to be constantly updating their knowledge (Schein, 1996). This may be particularly true in I.T. Flatter, delayered organisations may mean that the managerial career anchor could also be problematic. However, on the contrary, Schein (1996) points

[1] Their managerial orientation also includes a desire for a variety of different challenges, wanting to make a contribution to an area that is personally valued and the desire for status and prestige from membership of an organisation.

out that as work becomes more complex there will be greater need for the general management skills of co-ordination and integration at lower and lower levels of the organisation. Those people with security career anchors may find it increasingly difficult to find a place for themselves within the modern world of work; rather than relying on the organisation for security they need to become self-reliant. From Crepeau's (1992) research, it seems that those I.T. professionals with a security career anchor may be better suited to working within the I.T. function of large, possibly public organisations. Also some degree of security may be achieved by being a member of a profession which is in such demand. Conversely Schein comments that those with autonomy career anchors are models for future career actors as they are more self-reliant and flexible and thus fit with a changing environment.

Feldman & Bolino (1996) propose that although the majority of individuals may hold only one career anchor, some individuals may have primary and secondary career anchors. They also suggest that some career anchors are more compatible than others. Of note here is that according to their model managerial and technical career anchors are not at opposite poles, although neither are they adjacent. However, the technical career anchor is opposite to the autonomy career anchor and is adjacent to the security and challenge career anchors. Their model implies that technical orientated workers with their focus on the content of their work will find enacting the autonomy career anchor problematic: they may for instance have to put up with organisational constraints in order to focus on their work. It also shows that technically oriented workers and boundaryless careers may not be compatible. As far as value goes, those with the autonomy career anchor may therefore be sought-after, as might those with the managerial career anchor. Such career anchors might also be appropriate for hybrid I.T. professionals – the management career anchor was proposed as appropriate for hybrids by Earl & Skryme (1992). However, technical and stability career anchors do not appear to lend themselves readily to such roles or to boundaryless careers.

2.5.4 Technical vs. Managerial Careers

As already mentioned (section 2.4.1) there seems to be a lack of career planning and formal career paths within the I.T. profession (Crepeau et al, 1992). However, a tradition within the management of technical employees generally has often emphasised dual career ladders (Allen & Katz, 1986). This system is presumed to benefit both individuals and organisations, enabling technically orientated workers to

be promoted within their specialism, whilst allowing those who have the ability and inclination to move into management. The organisation thus provides career paths for both techies and those that are pursuing technical work as a stepping-stone into management and hopefully therefore maintains the motivation and loyalty of both. The premise of this system is that there is a dichotomy between technical and managerial competence (Feldman, 1988); a division that featured in Parts III and IV of this literature review.

Schein (1996) notes that a technical career anchor, with its focus on competence rather than results or personal drive, is not entirely acceptable and that many people with this anchor may publicly express a desire to get ahead into management. Conversely, the managerial career anchor is more publicly acceptable (Schein, 1996). Thus technologists often feel under pressure to move into management in order to continue to be respected and valued. For instance, Garden (1990) found that many more I.T. professionals expected careers in management than wanted them.

Zabusky & Barley (1996) show how technicians view their careers within occupational communities and see career success in terms of developing expertise within their field and gaining increasingly challenging work. They are not interested in moving away from their work into more managerial or supervisory positions. However, although they appeared to aspire to careers of achievement rather than of advancement, they felt that their organisations were not rewarding their increases in expertise and that their managers did not respect them. Thus those enacting alternatives to the traditional career may not automatically be valued.

Technologists often take a rather negative view of the organisation and its reward system (Loh et al 1995; Sankar et al, 1991). Indeed technically orientated employees are likely to be less satisfied in their current position than managerially orientated I.T. employees (Allen & Katz, 1986). Sankar et al found that technologists perceived managers to be over paid, more respected and regarded as more important than technologists. Technologists thus felt a sense of injustice, however, managers believed that they were fairly paid and did not believe that they were more highly regarded than technologists. Technologists also see their employing organisation as less progressive than those with a managerial orientation and perceive it as valuing procedure rather than accomplishment (Loh et al, 1995). Notably both managers and technologists agreed that technologists would need to move into management to gain pay and status (Loh et al, 1995; Sankar et al, 1991). Managers appear to hold somewhat contradictory views about the relative value and status of technologists and themselves.

Dalton and Thompson (and Price) investigated the differential status and value of technologists and managers within the traditional hierarchical model of careers and questioned why some technologists continued to be highly valued by their organisations whilst others did not (Dalton, 1989; Dalton & Thompson, 1986, 1971; Dalton, Thompson & Price, 1977). They propose a four stage model which allows a person at later career stages to continue to make a technical contribution (see Table 2-6). Thus at stage III, the person's role may take the traditional form of a management post or could be a technical position. At stage IV the person starts to influence the direction of the organisation, again this could be as a manager but might take the form of a technical innovator or entrepreneur. Their stages are not age related nor are they necessarily related to formal position. However, they are sequential and are related to value. Thus individuals at the later stages of the model had higher performance ratings and were more highly valued than those at earlier stages.

Table 2-6: Dalton's model of technical careers

Stage I	**Apprentice** - developing an identity.
Stage II	**Contributor** - developing a reputation as technically competent professionals who can work independently to produce significant results.
Stage III	**Mentor** – broadening of one's interests and capabilities; becoming mentors and consultants; dealing with people outside the organisation.
Stage IV	**Sponsor** – using judgement and skill to enable the organisation to interpret and respond to its environment.

With the more recent emphasis on team working and commercial awareness the technical apprenticeship career stage, where the apprentice is allowed to be a pure techie, has been challenged (Pemberton & Herriot 1993). Also although Dalton et al claim that their model offers a variation on the conventional hierarchical model, stages III and IV closely correspond to traditional management positions. A technical contributor, if he or she wants to continue to be valued, would still need to take on additional mentoring and directional responsibilities. Similarly, Schein (1993) notes that a technical anchor may be particularly problematic in later career. He observes that, as their career progresses those with technical anchors often use their experience and the broader perspective that this has given them to guide the young. He also comments that they may become functional managers but that this is something to be tolerated in order to continue in their specialist area. Dalton's model seems to support the traditional view of management as a reward for good technical work and as a higher-level role.

In their research, Roberts and Biddle (1994) investigate the belief that a high level of technical skill is a prerequisite for successful technical management. They found that technical workers who received high performance appraisals were also the ones who were promoted to management. Furthermore, those who were rated more highly in their technical appraisals were also evaluated more highly in their managerial appraisals. They conclude that management acts a reward and motivator for technical employees and that the best technical workers make the best managers. They also found that although there was some turnover of technical employees, those who left were the less able. Therefore, management as a reward for technical competence seemed to work. However, their findings rely on the performance appraisals of the employees and we are not given any details about these. As management is given as a reward for technical workers it may be that they are being evaluated for their management potential and only rated highly if they demonstrate managerial aptitude.

Badawy (1988) disputes that good technical workers make good managers. He argues that technicians are good at solving well-structured problems and are not prepared for the ill-defined problems of management. He finds that those who are equally capable in both areas are rare. He maintains that the convention of giving management positions as prizes to skilled technical workers means that technical management is not properly trained and ineffective. Indeed technical competence has been found to be negatively correlated with managerial competence (Crepeau et al 1992). As we saw in section 2.3 managers and technical professionals are often depicted as at odds with one another. However, it may be that managers of technical employees need a certain amount of technical expertise in order to gain the respect of their subordinates and to understand what they are doing (Roberts & Biddle 1994; Garden 1992). As also mentioned in section 2.3 managers and the professionals that they supervise are likely to be members of the same occupation and the transition into management may provide a career path for organisational professionals.

Mainiero (1986) found more harmony. In her research those employees who had decided to follow a management career path had demonstrated prior entrepreneurial initiative whereas those who chose a technical career path recognised some of the stereotypical characteristics of technical workers in themselves and judged themselves better suited to a technical career. However, she also distinguishes a third group of employees, those who felt forced to remain as technical professionals rather than follow the management track. They viewed their careers as a series of unconnected projects that had not allowed them opportunities for challenge or

advancement. They felt exploited by the organisation, de-motivated and disillusioned. Dual-ladder system may work well as long as people realise their abilities and limitations or at least agree with the organisation's appraisal of these.

2.5.5 Conclusion to Part 5 – Careers

This thesis investigates people's observation of valuable development routes i.e. careers within computing. The distinction between objective and subjective career is therefore not as clear-cut as it might appear. Both are social constructions and each informs the construction of the other. Within more flexible and dynamic environments, the subjective career may particularly come to the fore and help to define the objective. Inter-subjective agreement on what an I.T. career is and should be may therefore make up an objective I.T. career. It is therefore interesting to investigate this inter-subjectivity. Also much careers research concentrates on organisational careers; it may therefore be worthwhile to look at occupational careers especially at the level of a specific occupation.

This discussion of subjective vs. objective and organisational vs. occupational careers is particularly relevant given the recent interest in boundaryless careers. Within the boundaryless career people move towards more self-determined careers and away from externally, particularly organisationally, defined careers. People become more self-reliant and responsible for their own careers. Professional-style careers come to the fore. The occupation starts to play a greater role in career patterning and assessment and the labour market acts as a mechanism for signalling value. Learning and development become central as people try to enhance their own value and use their competencies to add value to the organisation. Boundaryless careers are about continual change and development and in turn they enable the organisations that temporarily contains the boundaryless career actors to also change and develop. The notion of a boundaryless career fits well with today's work environment and therefore those pursuing such a career should be valued. However, the traditional career is not necessarily dead.

Today careers may be less bounded but ultimately they will remain constrained by the career actor's perceptions of their own abilities and limitations. Schein's career anchors provide a good way of looking at possible self-concepts that affect people's careers. In keeping with the findings of previous chapters, managerial and technical anchors may be particularly relevant for I.T. professionals, although autonomy and security anchors may also be important. Technical and security career anchors are likely to be particularly problematic within today's work context in general and within

I.T. specifically. Conversely managerial and autonomy anchors may be more appropriate and lead to the person being regarded as valuable.

It seems that within a traditional hierarchical view of careers that a dual-ladder system would be appropriate for I.T. professionals. Such a system is based on the premise that there is often a fundamental difference between managerial and technical employees and that they should therefore be allowed to follow different career paths. However, even within a dual-ladder system the management path and those on it may appear more valued. Such a system may not therefore relieve the pressure that technologists feel to move into management in order to increase their status and rewards. Also managerial competencies may be particularly important for all employees, including technologists, to have within a boundaryless world.

2.6 CONCLUSION TO LITERATURE REVIEW

There is increasing recognition of the importance of knowledge to developed societies and their economies. Similarly, much emphasis is placed on the skills, expertise and competencies of their workforces. Employees are no longer just expected to do their job; they are expected to contribute to organisational success (section 2.1.1). Consequently, the definition and assessment of who is valued and what they "have" that is of value has become increasingly important. In keeping with this, there appears to be a rise in the number and type of credentials that people can now acquire. On the one hand, intellectual and cognitive skills appear to be taking centre stage; on the other, qualifications are also beginning to emphasise what people can do and the acquisition of specific skills (Thompson & Warhurst, 1998).

Whilst delineating and differentiating skills and expertise has become increasingly important, much of the employment world appears more fluid and ambiguous. Employees' roles seem to be less well-defined and their importance less readily signalled through their positions in organisational hierarchies (section 2.1.1). Indeed the onus is said to have moved away from the organisation as a structure within which individual value and careers are defined, forged and managed, towards a focus on self-development and career self-management (Arthur & Rousseau, 1996; Defillippi & Arthur, 1996). In turn, the occupation may be becoming a more important arena for the structuring of expertise and the defining of individual value (Gunz et al. 2000).

However, if the occupation also appears somewhat ill-defined, as computing does, it may not provide such a helpful or ready indicator of what skills, expertise and attributes are valued. The investigation of what signals guide people about value within such an occupation as computing is therefore interesting. In addition, the computer occupation appears to enable access to this "newly emerging" employment world. It is a knowledge-intensive industry in which there are continual skills shortages. There is an interest in the skills and expertise of computer staff, or more often, their lack of skills. Likewise, there is concern over the quality of the computer professionals' work and in ensuring its contribution to organisational success (section 2.4.6). Exploring the construction of individual value within the computing occupation therefore appears timely and worthwhile.

Nevertheless, surprisingly few studies focus on the computing occupation in any depth. It therefore appears important to distinguish it as an occupation in its own right

and to investigate at a detailed level the skills and expertise that are needed within the profession. The appropriateness of categorising computing as a profession, is however debateable – it might be better characterised as knowledge work (Fincham, 2000). Again, specific types of knowledge workers and knowledge work have also received little detailed attention in the literature.

The definition of computing as a profession, high-tech occupation or an example of knowledge work is not, in itself, so important, rather the importance lies in locating computing in relation to other occupations or within "the system of professions" (Abbott, 1988). This helps to define computing and assists in the investigation of individual value within it. This investigation into computing as an occupation in its own right, and in relation to other occupations, began here in the literature review and continues with the research about to be presented. The computer occupation is thus worthwhile investigating in itself, and also because it is a type of knowledge work, a high tech or technical occupation and an example of a new type of profession working within today's "modern" world.

The computer occupation is centred on computer technology and technical skills. Indeed, I have suggested that links with the technology appear to constrain whilst giving power to the occupation. The technological roots of the occupation provide it with coherence and help "codify" (Tolbet, 1996) it. Also, because of this "hard" codification, the more technological work of the occupation is part of its jurisdiction that other occupations would find difficult to take over. However, its close links with technology also seem to constrain computing to being "only" a technological occupation. The occupation may however be fighting against these constraints to become broader and more abstract (section 2.2.4)

The computing occupation is also very much an organisationally-based occupation. From the literature, the relationship between organisations and occupations appears an important and complex one (section 2.3). This is especially true in this study where the organisation appears to have a substantial role in creating conceptions of individual value within the computing occupation. It may be that organisational and occupational definitions of value conflict. Conversely, there may be some overlap between the occupation and organisation concepts of individual value. Indeed organisational ascriptions of value may be included within the occupation's conceptions of individual value (section 2.3.2). Within the computing occupation this issue seems particularly relevant. For instance, organisations have become increasingly dependent on computers: computers have become more deeply integrated into many different organisational functions and become essential to many

organisational processes. Likewise, computer personnel also appear to need to be integrated into the organisation.

Two types of organisational environments appear relevant to the computing occupation: computer departments and computer companies. It seems that computer departments may be particularly at odds with their host organisation and that thus conceptions of value between the two (occupation and organisation) may be particularly problematic (section 2.3.1). Staff computer professionals (those working in departments) may be less valued members of their profession. They appear to have fewer opportunities for career advancement and rely on organisational rather than occupational criteria for rewards. They are probably not (or are not perceived to be) as "business-like" i.e. they do not appear to face commercial pressures, as those working in computing companies. They are also likely to be somewhat cut off from the wider organisation and occupation. Specifically they may be less committed to their organisation and to the wider occupation, which may lead to them being less valued members of the both (section 2.3.2).

The organisational-professional literature largely focuses on professionals working within non-professional organisations, as this is a situation in which professional-organisational problems particularly seem to arise. Within this literature there appears to be a deeply ingrained belief in this incompatibility between managerial and professional cultures or more specifically between the organisation and I.T. A great deal of importance is consequently placed on managing or closing this gap between organisation and profession. This gives rise to the need to get the balance right between the separation and integration of I.T. professionals within organisations. This problem can be reframed as one of managing the boundary between the organisation and the occupation both internally (between I.T. department and the rest of the organisation) and externally (between the I.T. department and the wider I.T. industry) (section 2.3.4).

At the individual level, this gap often appears as a "them and us" situation between computer professionals and others, in which they are odd and we are normal (Sproull, Kiesler & Zubrow, 1984). With regard to skills, as in other occupations, there appears to be a hand-head division of tasks whereby cognitive more managerial-style skills, such as interpersonal skills and organisational knowledge, are distinguished and valued above more manual, machine-orientated, technical skills (section 2.4.6).

Women as a group seem to find this technocentric orientation within computing particularly alienating. Many fewer women study and work in computing than men

and they appear to be attracted to particular types of work and to study certain subject areas and courses. Whereas a more masculine computing occupation and academic area would focus on computers as machines and technology, a more feminine version of the occupation and subject area would be more interested in computers as tools and relationships with people. This more feminine influence, I suggest, would seem to be needed within I.T. (section 2.4.4).

Consequently, although computer professionals in general are heralded as valuable and in short supply, the focus in the literature is often on what computer professionals lack rather than on the skills and competencies they have. Computing skills and expertise are criticised both within the world of work and within the world of education. In both cases computing and computer personnel are largely criticised for not being business-orientated and commercially-focused. Computer personnel are thought to lack interpersonal skills and appear unable to work readily within a team and fit in and contribute to an organisation (section 2.4.6).

The closure of this gap between organisation and profession can be seen, at the individual level, in the efforts to fuse technical and business skills and thus to produce a hybrid I.T. person. Hybrids, in effect, act as intermediaries and translators between the organisational or business world and that of the I.T. departments and the wider I.T. Industry and its technology. Although it seems computing professionals are largely criticised for not being more hybrid, organisational and business staff could also be criticised for not being more technical. It may be that the work environment, organisational policies and the narrow expectations of others straightjacket I.T. personnel into being techies and help prevent them developing into hybrids (section 2.4.7).

Hybrids' boundary-spanning role makes their position somewhat ill-defined and precarious; they are in danger of neither belonging to the I.T. nor business nor organisational world. This ability of hybrid computer personnel to link two disjoint areas seems central to their value. It may be their ability to combine skills that are apparently opposites; their ability to accept the ill-definition and uncertainty of their role and the risk this entails, is what makes them rare and valuable.

Although computer personnel are criticised for their lack of willingness to change there are suggestions that computer professionals have moved from being "mechanistic enthusiasts" to "pragmatic romantics" (Dahbom & Mathiassen, 1997). Likewise the work of the profession, I suggest, may have changed from being very treatment-orientated to being more involved in diagnosis and inference (section

2.4.8). These changes may give computer professionals a wider, more important, role but by doing so leads to them being increasingly criticised and challenged. Paradoxically it is this change in their role towards being more useful and valued that appears to have stimulated criticism.

The value of a computer professional may not just be to do with their skills and attributes, but may be affected by the development of those skills and attributes over time i.e. the career that they have or follow. This seems particularly important to look at when development and learning are also a focus in the "new" employment environment and are obviously so closely related to skills and expertise.

Within the careers literature, this gap between I.T. and the organisation can be seen in the way a career is viewed as organisational or occupational; managerial or professional; or hierarchical or lateral. Dual career paths are created to channel and manage the careers of those who are more managerial or those who are more technical. Also the movement within a career from technical to managerial is viewed as a transition that is likely to be problematic (section 2.5.4). The assumption that the organisation and the profession are at odds is thus noted in different areas of the literature.

Research on boundaryless careers is particularly relevant here because it signals a move away from more externally defined, particularly organisationally defined, careers towards a more self-determined and possibly more occupational career (section 2.5.2). It is also a type of career that is associated with knowledge workers (Ellig & Thatchenkery, 1996). Although organisational careers are often investigated, occupational careers are given less attention in the research literature. A valuable I.T. career may therefore be an instance of a boundaryless career. Thus this research may help to explore boundaryless careers. In particular, the relationship between organisational and occupational careers may be illuminated. The concept of a boundaryless career seems to fit in well with today's "new" world of work and the implication is that those following such a path should be valued.

This study therefore explores the computing occupation and in particular what skills, expertise, knowledge etc are considered valuable within the occupation. Specifically it investigates:

How I.T. managers account for individual value and its development – i.e. what are their shared interpretations and common beliefs about individual value and its development?

⇒ To what extent are women computer professionals valuable?
⇒ To what extent are there differences between individual value within different types of organisational environment?
⇒ What are seen as the skills, expertise etc of a valuable I.T. person: what are they like?
⇒ What is seen as a good development path for individual value?
⇒ What are the meaning structures and common themes that define individual value within the computing occupation?

3 METHODOLOGY

The aim of this chapter is to clarify the philosophical assumptions that underpin the research; to explain and justify my approach and to outline the methods used for data collection and analysis.

This study investigates the conceptions of individual value that exist within the I.T. occupation. It is therefore exploratory. I do not hope to uncover one or a number of definitions of value, rather the study is located in the realm of people's perceptions and constructions of reality. I am interested in the perceptions and understandings that I.T. managers have of the individual value of their staff. The study is therefore concerned with the values, expectations and beliefs of individuals. It focuses on how I.T. managers make sense of their world. This focus on meaning is central to the interpretative approach to social sciences.

3.1 A QUALITATIVE APPROACH

The study's methodology is broadly qualitative. In contrast to the traditional positivist view, it holds that there is no independent reality separate from the researcher or the researched to be discovered. It is relativist in that it recognises the possibility of numerous different, equally valid interpretations of the world. It thus places emphasis on the individual's subjectively perceived world rather than an objective reality. Given the subjective nature of the social world Dilthey (1976) argues that social science should be oriented towards understanding rather than explanation. The goal of an interpretative approach and this study is understanding; the researcher's role is to interpret the meanings that individuals ascribe to phenomena in their everyday social context.

In a qualitative study, the researcher's purpose is to uncover their informants' subjective meaning. The researcher also has his/her own subjectivity. Indeed the whole research process, including selection of the area of study and questions to be investigated moving through to the discussion and dissemination of findings is subjective. Rather than try to eliminate the researcher's subjectivity from the research a qualitative study recognises the active role of the researcher coming to know the world. It acknowledges that the researcher is inextricably part of the phenomenon studied, in other words the research is reflexive (Hammersley & Atkinson, 1995).

3.2 INDIVIDUAL AND CONTEXT (ONTOLOGY)

In a post-modern era the conception of a fixed, underlying reality which can be known is replaced by a reality that is constructed. However, whilst a strict post-modern view of reality would not see the point of looking for underlying essences on the grounds that there are none, I believe that while there may not be any underlying fixed reality to uncover there are inter-subjective systems of meaning that can be uncovered. Reality is socially constructed through dialogue and interaction and valid knowledge claims are negotiated (Kvale, 1996). Gergen (1985) explains that the social worlds within which people live are constructed through shared language, values and norms and through shared culture. They are created by the interaction between the individual and others - just as research is co-created by the researcher and the researched and between the researcher and the research community. Our beliefs about the world are thus social inventions created by our "conversations" and interactions with others.

Phenomenology is committed to describing and clarifying the essential structure of this everyday world (Ray, 1994; Giorgi, 1975). However, it is important to distinguish between Husserlian and Heideggarian versions of phenomenology. Cohen & Omery (1994) explain that whereas Husserl aimed to uncover the essential essences of things and give them precise descriptions, Heidegger emphasised understanding these essences and uncovering the presuppositions that made that understanding possible. Husserl wanted presuppositions bracketed whereas Heidegger argued that it was these very presuppositions that made intelligibility or meaning possible. Interpretation is by its nature not presupposition-less; the interpreter cannot jump outside the traditions of understanding within which she lives (Kvale, 1996). Indeed if she did manage to do so, she would not have any basis on which to understand the world that she had left behind. This research involves interpretative understanding rather than description and thus takes a phenomenological approach that is more Heideggarian than Hursserlarian.

Cohen & Omery, (1994) further explain that from a Heideggerian viewpoint human beings are essentially beings that interpret the world and choose different ways of being. The individual is thus active and self-determining but within an "inherited, yet chosen frame of possibilities" (p144). In order to change themselves a person must "also change at least part of the social world that shapes *its* identity" (Fay, 1987, p51). Similarly, a perceived change in the social world must be accommodated in the individual's view of the world and hence their sense of self. Both individual and context are in a continual interrelated process of change. Reality is therefore neither

independent of and outside the individual nor does it exist inside a person's mind, rather it exists as an interactive flow of constantly negotiated and changing realities (Hoffman, 1990). Objective and subjective views of reality thus give way to a reality that is inter-subjective and inter-relational (Kvale, 1996). This is not a case of unifying the two poles of subject and situation; rather it is that neither can exist except in and by its relationship to the other (Lyotard, 1991).

3.3 THE RESEARCHER, THE RESEARCHED AND RESEARCH (EPISTEMOLOGY)

The data gathering part of the research is informed by the phenomenological emphasis on understanding social phenomenon from the informants' perspectives. Nonetheless, the understanding gained is inevitably a translation from the managers' systems of understanding to my own. This translation takes place through the interaction between myself and those researched. The researcher is always a participant and co-creator of the world that is studied (Dey, 1995; Hammersley & Bird, 1996). The understanding generated is made possible by assuming some existing ground for shared understanding or creating some new ground. Outhwaite (1985) explains that fundamental to human existence is the possibility to understand what it is like to be another human being; all human beings are rooted in the social world that makes understanding another's personal social reality possible. Ray (1994) expands on this when she talks about the "universality of subjectivity" (p124). She explains that language use represents something common to many in a culture or to the human condition of many cultures and is thus part of the objective mind. Everyone who acts therefore acts in a common sphere and is connected by something that people have in common. Thus another's world can be understood by the researcher imagining variations in the general structure of their own world. The result is not just to illuminate the researched world but also the researcher's own world (Cohen & Omery).

In addition, whereas some phenomenological texts stop at precise description of the respondents lived world this study goes on to analyse and explain. Dingwall (1992) advises that there should be a clear distinction made in a research report between the raw data and the analysis produced. Likewise, I make a distinction between firstly aiming to gain access to the managers' perceptions whilst secondly taking those perceptions and analysing them according to the purposes of my research and my audience. Ultimately the interpretations of the data are mine and go beyond merely trying to describe what was there or reflect what the managers said. Lincoln & Guba

(1985) argue that there are two possible groups of people that research must be credible to - the respondents and the consumers. Although they acknowledge that it is the consumer who is ultimately the person whom the research must convince, they advise "without their *(the respondents)* concurrence no outside observer would find the study credible" (p328). I would hope that the managers in my study would, if not agree with my findings, at least recognise that they are a possible interpretation. However, the aim of my research, unlike some ethnographic work, is ultimately not an attempt to show the world as seen through the eyes of the managers. The aim is to gain an understanding of the managers' world(s) as they see it and then interpret what this means in a wider sense. It is the distinction between whether a study places emphasis on the contextually specific or attempts to abstract more general patterns and theories (Altheide & Johnson, 1996).

Theory use and creation can however be problematic within phenomenology largely because of the fundamental belief in looking at things themselves as they appear in the lived world. The traditional Hursserlarian approach relegated theory from both data collection and analysis and indeed Van Manen (1990) believes that theory is antithetical to phenomenology. However, the universality of subjectivity shows how phenomenological research can use and advance theory – existing theory becomes part of the preconceptions which make new understandings possible, these new understandings in turn become part of our preconceptions which we use to interpret the world. Just as the hermeneutic circle of interpretation involves a process where the meaning of the separate parts of a text is determined by the whole and their interpretation in turn changes the meaning of that whole in a spiral effect, so the research text itself is also part of a wider field of research which it both adds to, changes and gains meaning from (Ray, 1994).

This hermeneutic process of understanding the data could be infinite as no ultimate resolution of meaning is possible. For a phenomenologist this process actually stops when "a valid unitary meaning, free of inner contradictions" is reached (p47, Kvale, 1996). This idea of a coherent gestalt free of contradictions implies a world free of contradictions; however I prefer a more dialectical focus on internal contradictions. With a dialectical view "the objects of the human sciences are seen as multifaceted and contradictory, consisting of internally related opposites in continual change and development" (p56, Kvale, 1996).

My research aims to understand what makes the phenomenon of individual value within the computing occupation what it is. It seeks to uncover, at least at some level, underlying structures and meanings that are being used to define individual value.

This involves an essentially interpretive process in which meaning derives from context. Furthermore, knowledge is perspectival, which implies that there can be more than one valid interpretation, each depending on the local context and the viewpoints and values of the investigator. Hence the attention in the literature review to outline the context within which individual value within the computing occupation is being defined and the attention in the introduction and here to define my perspective.

3.4 RESEARCH DESIGN

3.4.1 Research Questions

The research questions were largely influenced by my own experiences and reflections on working within the I.T. industry. A review of the literature showed that there were some interesting dilemmas concerning skills within the I.T. occupation and some resonance between my own reflections and issues raised within the literature. The research questions are shown in

Figure 3-1. They aim to explore as fully as possible the phenomenon of individual value and its development within computing.

Figure 3-1: Research Questions

How do I.T. managers account for individual value and its development – i.e. what are their shared interpretations and common beliefs about individual value and its development?

- ⇨ To what extent are women computer professionals valuable?
- ⇨ To what extent are there differences between *individual value* within different types of organisational environment?
- ⇨ What are seen as the skills, expertise etc of a valuable I.T. person: what are they like?
- ⇨ What is seen as a good development path for individual value?
- ⇨ What are the meaning structures and common themes that define individual value within the computing occupation?

3.4.2 Research Method

I used semi-structured interviews, to investigate with I.T. managers and other managers their current conceptions of individual value within the I.T. occupation and the development of that value. The aim of the interviews was to provide an in-depth picture of the concept of individual value and the definition of that value within the context of the I.T. occupation. The intention was also to include as wide a cross-section as feasible of different sorts of organisational environments in order to make the picture as broad and diverse as possible. Therefore, both depth and breadth

were aimed for in order to make the resulting interpretation as informative and inclusive as possible.

The Sampling Strategy

Thus the sampling strategy used here is probably best described as purposeful or criterion-based sampling (Maxwell, 1996). The crucial point of such sampling is to select individuals or settings that enable the researcher to answer their research questions. For example, Weiss (1994) claims that rather than using samples qualitative interview studies often use "panels" - "people who are uniquely able to be informative because they are expert in an area or privileged witnesses to an event" (p17). Thus managers and organisations were chosen for their presumed ability to add something to my understanding of the phenomenon of individual value and with that aim in mind were chosen for their diversity of organisational context. Also snowball sampling, where one informant recommends another, was used, particularly to obtain a second interview within the same organisation.

Organisations - The breadth of the study was given by the diversity of organisations involved. The categories of organisations chosen were influenced by my own experience and the literature reviewed. So for instance, an important distinction from the literature is between the organisational contexts of computer companies and that of computer departments. Work-group size was another factor from the literature that could be important for value. Also as Garden (1990) amongst others has pointed out, skills and careers research often concentrates on large organisations, hence an effort was made in this study to include smaller organisations. The I.T. companies were therefore chosen to include companies of different sizes and I.T. departments to try and include departments of different sizes. Further, the organisations in which the I.T. departments were situated were chosen to include those from different industrial sectors and those from both public and private sectors. Similarly, the intention with the I.T. companies was to include some companies whose main business was more hardware orientated, some who were more software focused and some who were more service based.

Managers - The depth of the study was provided by semi-structured interviews with an I.T. manager and preferably one other manager per organisation. Two managers per organisation would provide alternative perspectives and a richer more complete picture. The rationale for choosing I.T. managers as informants was discussed in the introduction and is summarised in Figure 3-2. Interviews were sought with I.T. Managers who had both an overview of the organisation in which they worked and

the I.T. staff required, including knowledge of individual staff and their day to day role within the department/ organisation. Such managers were likely therefore to have an informed point of view of the individual value of I.T. staff. It was anticipated that these managers would be higher up in the organisation than line managers.

Figure 3-2: Why I.T. Managers

- They have been rewarded for their value.
- Many are likely to have had a career in I.T.
- They are therefore likely to have made the transition from I.T. person proper to manager which as well as a topic within careers literature also relates to other discussions around organisation vs. occupation and technical vs. managerial points of view.
- They are likely to have had a career of some length and of some interest - in the sense of having navigated themselves to where they are now.
- They are in a position to have an overview of the workplace.
- They are in a position to "legitimately" affect the workplace.
- They are in a position where they are likely to have reflected to some degree on how the organisation and I.T. profession "work" and what is valued within each.
- They may act as gatekeepers for the occupation by helping to define what is valued and the career paths of occupational members (Tolbert, 1996).

A subsequent interview was sought within each organisation with a second manager who would provide an alternative "knowledgeable" perspective of the skills and attributes valued within the I.T. occupation. Different types of second managers were interviewed in I.T. companies and departments because of the difference in the nature of the two types of organisation. In the I.T. departments, an ideal second manager to interview was a manager of a user department. Interviews were sought with user managers whose departments were particularly heavy users of the I.T. department's facilities and who were therefore heavily involved in interacting with I.T. staff and managing others who also did so. Within I.T. companies, a second interview was sought with a recruitment or personnel manager.

Given the possibility of women having a particularly different view of I.T. work and technology, a conscious effort was also made to include women's perspectives. Where possible therefore women managers were interviewed.

Recruitment of Participants

Interviews were initially sought with I.T. managers. Names and contact details of people within organisations were obtained from friends and colleagues. Some of these contact details were for I.T. managers themselves, others were for people who might suggest the name of an I.T. manager. In addition, I got phone numbers and email addresses of organisations from career's literature and the Internet. When I did

not actually have a name of anyone within an organisation I contacted the personnel, or less frequently the marketing, department to see if they could suggest the name of a friendly manager. The response from people ranged from being remarkably helpful to complete disinterest.

Once I had obtained the name and address of an I.T. manager, I sent him/her an introductory letter briefly explaining what my research was about and included an example of the sort of questions that the interview would entail. The example questions were included to give managers as clear an idea as possible about the content of the interview and hopefully to reassure them that it would not be too demanding. The letter was followed up about a week later by a phone call in which I asked managers if they were interested in taking part in the research, and if so, arranged dates and times. At the end of the interview I asked I.T. managers if they would suggest the name of a personnel or user manager who might be willing also to be interviewed. Therefore selection of all second managers to be interviewed was in effect done by I.T. managers. A couple of managers also suggested I.T. managers in other companies whom I could contact.

The Actual Sample

Table 3-1: The Managers Interviewed (Departments)

I.T. DEPARTMENTS					
Business	**I.T. Manager Interviewed**	**User Manager Interviewed**	**I.T. Managers' Backgrounds**	**No. of I.T. staff**	**Code**
- Private Org.					
Engineering	IS Director (MALE)	Senior Personnel Officer (MALE)	I.T. for 30yrs.	50-60	DEng
Telecomms.	IS Manager (MALE)	Manufacturing Manager (MALE)	I.T. (& engineering). 25yr career @ DTel	70	DTel
Publishing	Manager of Network Services (MALE)	----------	I.T. - many yrs @ DPub. Promoted within Dept.	40	DPub
Banking	Bank account products Team Leader (MALE)	Head of Card Operations (FEMALE)	I.T. for 15+ yrs. 1yr @ DBa.	50-60	DBa
Pharmaceuticals	I.T. Manager (MALE)	Logistics Manager (MALE)	I.T. 10+ yrs @ DPh	130 in UK	DPh
- Public Org.					
Higher Education	Computer Services Director (MALE)	Computer users committee chair & Senior Lecturer (Geography) (MALE)	I.T. for 25yrs. Most of those spent at DHE	47-48	DHE
Health Care	I.T. Manager (MALE)	Assistant Director of Patient Care (MALE)	I.T. for 23-24 yrs He set up the I.T. unit 4 years ago.	12	DHC
7 I.T.Managers – no female managers		**6 User Managers - 1 female user manager**			

Table 3-2: The Managers Interviewed (Companies)

I.T. COMPANIES					
Business	**I.T. Manager**	**"HR" Person**	**I.T. Managers' Backgrounds**	**No. of I.T. staff**	**Code**
Software Development	Managing Director who was also responsible for recruitment (MALE)		Engineering => management	30 total	SCMd
Software Development	Corporate Services Manager incl. Personnel (FEMALE)		Finance & adult education. 4.5 yrs @ SCEd	26 total	SCEd
Software Development	General manager (MALE)	Recruitment Company Director (MALE)	I.T. for 20+ yrs. 10 yrs. @ CSw	500 in UK	CSw
Consultants - engineering software.	Support and Training Manager (FEMALE)	Human Resources Person (FEMALE)	I.T. for ~17yrs. Just joined CEng	120 in UK	CEng
Consultants - financial solutions software.	Business Manager - manager of key accounts. Also responsible for recruitment (MALE)		I.T. 16yrs @ CFi.	65 at site (530 in UK)	CFi
Systems integration	Skills development manager (MALE)	Organisational Development Manager (FEMALE)	I.T. 32 years @ C	2500 in UK	C
Business & Management Consultancy, I.T. outsourcing, Systems integration	Business Development Director (MALE)	----------	I.T. (sales) for ~15yrs. Just joined CC. Prior to that 10 yrs in a large I.T. co.	2500 in UK	CC
I.T. Outsourcing	Recruitment Manager (ex project manager) (FEMALE)		I.T.	1700 in UK	CO
8 I.T. Managers - ~3 females		**"HR" ~4 females**			

The sample of managers who took part in the study is depicted in Table 3-1 and Table 3-2. The codes listed in the tables are used in the analysis that follows this chapter to identify which manager is being quoted. Departmental managers' codes begin with "D", most company managers' codes begin with "C", the exception being those in the two smaller I.T. companies, which have codes beginning "SC". The rest of the code denotes the type of business that the organisation is in, e.g. "Eng" for engineering, "Pub" for publishing etc. To differentiate between the I.T. manager interviewed within an organisation, and either the user manager or human resources manager, a "U" or a "P" is added to the code (this is not shown in the tables). Thus, the I.T. manager of the first organisation listed in Table 3-1 is denoted by the code "DEng" and the user manager by the code "DEngU." The code of the I.T. manager of the third company listed in Table 3-2 is "CSw" and the code for the human resources manager is "CSwP."

In all twenty-four interviews were carried out covering fifteen organisations: Seven I.T. departments and eight I.T. companies. The seven I.T. departments included two within public organisations. The I.T. companies were of various sizes, including two that were considerably smaller than the rest (SCMd & SCMd). Within each organisation an I.T. manager was interviewed; fifteen in total. In addition, within the I.T. departments, six user departmental managers were also interviewed. At one company, it was not possible to get a contact name of a user manager. Within the eight I.T. companies, three interviews were also carried out with a personnel or recruitment manager. In four companies, the I.T. manager was also responsible for recruitment. In the remaining company, it was not possible to get an interview with a personnel manager. None of the departmental I.T. managers were women, three of the I.T. company managers were women, one user manager was a woman and two of the personnel managers were women.

My interview questions were about managers' perceptions of the value of their I.T. staff. Consequently, I did not actively seek a great deal of information about the managers' backgrounds, either within their present company or concerning their career generally, however I did gain some insights. Most of the I.T. managers had a background in I.T.; the exceptions were the two managers interviewed in the two smaller companies. One of those managers had had a career as an engineer prior to becoming the managing director of SCMd. The other had had various administrative jobs before joining SCEd. The other 13 I.T. managers all had a career in I.T. spanning at least fifteen years and all but one had held technical positions. The one exception was the manager at CC who had followed a career in I.T. sales. About half of the thirteen managers with careers in I.T. had been in their present company for at least ten years. Of the remainder, at least four had spent a large part of their careers (ten years) within one company. The I.T. managers therefore largely gave the impression of people who had worked their way up within a company.

Given the time frame available and the nature of the research, fifteen organisations and twenty-four interviews seemed sufficient. More important though is Kvale's (1996) advice that resonates with the idea of purposeful sampling mentioned previously: - "interview as many subjects as necessary to find out what you need to know" (p101). Towards the end of the period of interviewing I started to feel that I largely knew what managers were going to say in answer to my questions. Often their responses seemed consistent with those in previous interviews or at least appeared to be within the same realm of meaning. It was as if a "saturation point"

had been reached (Glaser & Strauss 1967) and that helped assure me that enough data had been gathered.

I was largely satisfied with the number and diversity of organisations and individuals included, although I would have liked more women I.T. managers. Also classifying I.T. companies as mainly hardware, software or service focused proved more difficult than I had anticipated and gaining interviews with I.T. companies that could be classified as hardware-based was impossible. All respondents interviewed described their companies as service companies. With some companies the services that they provided were based around their own software, hence they have been classed as software-based companies. For others the service was more general, covering for example advice on, selection or integration of different hardware and software products, hence they were classified as service companies.

Out of the seven companies approached who I thought would count as hardware-based companies only one I.T. manager agreed to be interviewed. However, both he and the personnel manager interviewed described the company as traditionally hardware-based but said that it was now a service company and that hardware only accounted for a small part of its business. Furthermore, both the I.T. manager and the personnel manager worked in service parts of the company. Another manager who had recently left a traditionally hardware-based company, which had now also changed focus to be a service provider, told a similar story. For the current research, it was not essential that hardware companies were included but it did mean that the sample had less breadth than I had hoped. It also highlighted a problem of definition, which was a feature of the research. The repositioning of hardware companies to be service providers did however tie in well with the literature on changes over time in the I.T. industry, which points to I.T. companies becoming less hardware and more service focused. It also related to the literature suggesting that the companies and the economy are changing to be less about providing products and more service orientated (see section 2.1.1).

The Interviews

The interviews were semi-structured or "non-directive" as Hammersley & Atkinson (1995) prefer. They were therefore neither a free conversation nor a highly structured questionnaire. The more structured an interview the easier it is to compare the data gathered between sources. Conversely, less structured interviews enable more depth, exploration and explanation. A structured interview thus effectively employs pre-analysis reducing the complexity of the subsequent analysis of the interview data.

This would be inappropriate for a phenomenological study as it goes against the idea of "bracketing" (Hycner 1985, p281) prior assumptions and finding out about a phenomenon by going to the thing itself rather than employing existing theories. The idea of the interviews was to allow participants as much freedom as possible to talk about what they felt was important while remaining within the scope of the study.

The Interview Guide - The interview guide provided a structure within which to work and an outline of areas that it seemed fruitful to cover in order fully to explore the area. However, it was also just that, a guide from which I could digress in order to follow up any unforeseen topics that were mentioned or seemed relevant. The guide acted as a reminder and a comforter for me. It contained the broad themes that were subsequently covered in almost every interview and within each theme possible questions that might be asked. However, no attempt was made to ask exactly the same questions in exactly the same order or same way to every participant. The interview guide was developed from the literature; Table 3-3 outlines the guide and the connection to themes within the literature.

Table 3-3: Interview themes

Themes	Reasoning	Influences within the literature.
Introduction: - asking managers to introduce themselves, their organisation and their role in the organisation.	To get some background and contextual information and help establish rapport.	It helps to establish rapport by beginning the interview with a "safe" question (Whyte, 1982). It helps to place the managers comments within some sort of context.
Value: - asking managers about their I.T. staff, the skills and attributes they value, why they value these and how they recognise and reward that value.	This allowed for some exploration of what the manager's I.T. staff were like and a discussion of the relative merits of different skills, particularly technical, managerial, interpersonal and organisational skills.	The stereotypical technical person (Turkle 1988, 1984) is reflected in the profile of computer professionals (Garden, 1992; Couger, 1988). The literature discusses technical vs. more people oriented/business skills (Brookes 1995; Pemberton & Herriot, 1993). It also discusses the merits of hybrids (Couldwell, 1998; Skryme, 1996).
Development of value: - how these skills and attributes are developed, via what experiences.	This enabled a discussion of skill and career development, including possible career stages, career paths and ideal careers. Also enabling an exploration of progression, success and what drives people.	Valued careers might be more boundaryless (Defillippi & Arthur, 1996) or more conventional (Guest & McKenzie-Davey, 1996) and might follow discernible stages (Dalton, 1989). They might also involve people with particular career anchors (Schein, 1993) or work expectations (Couger, 1988) and involve transitions from technologist to managerial roles (Lawrence & Biddle, 1994)
Graduates: - manager's perceptions of the extent to which graduates or people at the beginning of their careers are valuable and the skills/attributes they have or do not have.	This was included to provide an insight into managers' views of people at the start of their career i.e. in what ways they are valuable and how managers perceive that they develop from this beginning.	This relates to the disagreements in the literature about the content of computing degree courses. On the one hand, courses are criticised for failing to provide the technical content and rigor on which to build a computing career (Parnas, 1990 and Dijkstra 1989). Others argue that courses should place greater emphasis on human relations and business skills rather than technical (Dench, 1998), possibly even redefining what we mean by technical expertise (Dahlbom & Mathiasson 1997).
Managers: - manager's perceptions of the extent to which managers as a group are valued, the pathway into management and the need for a manager to have a technical background.	This was included to give managers the opportunity to talk about the transition and route into management and more generally the role of management.	Technical people are often under pressure to move into management (Sankar et al, 1991). However, a high level of technical skill may or may not a sound prerequisite for management (Lawrence and Biddle, 1994; Badawy, 1988). Also there may be a "clash" or fundamental differences between the technical and managerial worlds (Raelin, 1991; Bailyn, 1985,88).
Women: - the extent to which women take on different roles to those of men and therefore possibly are valued	This was included to provide an insight into managers views of women I.T. staff i.e. in what ways they are	The literature suggests that women find the stereotypical computing culture and technical work alienating (Turkle 1988, & Bailyn 1987). Their interest is in computers as tools rather

Themes	Reasoning	Influences within the literature.
differently and have different careers.	valuable and whether they are viewed differently than men.	than in computing technology (Rassmussen & Hapnes, 1991). As such women in computing tend towards different types of roles than men (Bednar & Bissett, 2001).
Tensions etc: - any tensions they perceive in relation to what they want of their staff and what their staff themselves want. The interview also ends by giving them chance to add anything further.	This was included to bring out any tensions between the organisation or management and I.T. staff that had not already been covered. It also gave managers the opportunity to add anything important which had not been already been covered.	Explores potential conflicts between the organisation and I.T. personnel (Wallace, 1995 - Dalgleish, 2000; Bento, 1996) or within organisational policy (Scarbrough, 1999).

The guide was used for all interviews with I.T. and personnel managers. A cut down version of the guide was used for the interviews with user managers as it seemed unlikely that they would know about the development and careers of I.T. staff.

The Actual Interviews – Interviews were carried out during 1997 and 1998. Questions were kept as open as possible, thereby encouraging interviewees to introduce their own topics and talk freely. This "openness" was in keeping with the overall philosophy of the research, which aimed to allow meanings and themes to emerge rather than to define them a priori. In particular, "valuable" was not defined for managers but was left for them to interpret in their own way. I tried to avoid asking leading questions and expressing or signalling my own opinions. I also tried to ask interviewees for further explanation when the meaning of the terms they used or statements they made needed clarifying. Similarly, in order to clarify their meaning and validate my interpretation, I also tried at times to reflect back to interviewees, in my own words as a question, what interviewees had said to me. During the interviews, I would often pick up on what the interviewee said in order to ask more and to lead in to the next question. This made the interviews flow and seem more of a conversation than if I had just sat and asked exactly the same questions of each person. It also helped to establish a relaxed atmosphere in which the interviewee was reassured that I was interested and listening to what they were saying.

The interviews with I.T. managers lasted about 1 1/4 to 1 1/2 hours each. Those with personnel managers were between 3/4 to 1 1/2 hours long and those with users lasted about 1/2 an hour each. Where possible managers were interviewed face to face, however, given the travelling that this sometimes involved, some interviews were carried out by telephone: one I.T. manager, one personnel manager and three

user managers were interviewed in this way. All managers were interviewed at their place of work and all interviews, including the telephone interviews, were recorded, transcribed and summarised. Immediately after the interview and during the transcription I made notes on anything that seemed important, either for future interviews or for the forthcoming analysis. Each summarised interview was returned to the interviewee to enable them to see my interpretation and modify it if they wanted. Seven of the twenty-four interviews were returned to me, six with minor alterations and comments. The seventh had more extensive alterations, many of which involved inserting qualifiers into the text. The amended interviews were used as data. The summaries thus gave me a way of checking my interpretation and gave the interviewee feedback about what I had made of their words.

I was surprised at how easy it was to get people to talk. I tended to allow interviewees to talk rather than interrupting them and listening to the tapes afterwards my relative contribution in terms of time or number of words spoken was very small.

Research Relationship

The interview meeting began with me assuring participants of confidentiality, telling them briefly about my research and giving them the opportunity to ask me any questions. At the start of the interview I asked managers for brief descriptions of their company / department and themselves. Therefore, the start of the interview meeting was introductory and intended to establish rapport. Also I left what I considered were the most "threatening" questions until the end of the interview i.e. asking about tensions between I.T. staff and the organisation and about female staff taking on different roles to those of male staff.

My role in relation to the managers was of someone that they could help by giving some of their time and sharing the opinions that they had formed during their years of experience. I tried to adopt the role of an intelligent, interested outsider, who knew very little about their particular organisation but who had some overall understanding of the sort of issues that they might be facing.

Throughout the interviews I tried not to appear judgmental about anything that was said, just interested and understanding. In particular, I tried never to give the impression that I disagreed with anything that an interviewee said. I also told interviewees very little about my background in I.T., and only briefly about my research and that I was at The Business School at Loughborough University. The information about my research was necessary and the fact that I was working for my doctorate at Loughborough University Business School gave me credibility. However,

I felt that too much information about me as an individual, particularly concerning my I.T. background, would lead interviewees to react more to me and tailor their answers to me as an individual. Instead, I hoped to present a fairly neutral and anonymous person who was easy to talk to and be open with. Sometimes managers asked me for my opinions. I always avoided answering such questions. Again I did this largely in order to remain anonymous and because I did not want the interviews to turn into "conversations."

I think the role that I adopted was successful in the sense of providing someone who managers would talk with relatively openly but also someone whom they would not notably tailor their accounts towards. Managers were not being asked to talk about anything particularly personal and given their positions within their organisations, it seemed unlikely that they would find the interviews particularly "threatening" or "difficult." Managers seemed to talk freely and be happy to share their opinions.

3.4.3 Data Analysis

There has been a lot written about the analysis of qualitative data (e.g. Glaser & Strauss 1967; Miles & Huberman, 1984; Ritchie & Spencer 1995). Often the analysis procedures proposed in this literature involve similar steps – see Figure 3-3 (Morse, 1994). However, these guidelines belie the level of complexity and time necessary for this analysis. Also the precise "how" of working through each of these steps is possibly only something that can be known by doing it.

Figure 3-3: Data Analysis & Theory Development in Interpretive Phenomenology (Morse, 1994)

1. **Comprehending** this starts by the researcher first reflecting on their own experiences and then seeking out the experiences of others and gaining a view of their worlds.
2. **Synthesising** involves thematic and inter-participant analysis. Interviews are merged into composite or typical patterns and described. This decontextualises the data; involves sifting the significant from insignificant; and looking for explanations for variations in the data. The very process of sorting and re-sorting the data facilitates the cognitive process of synthesising.
3. **Theorising** is done by writing and re-writing, increasing the level of abstraction and moving the descriptions away from the particular to the more universal. The process of writing gives the data structure and sensitises the researcher by providing new insights. The outcome is that which provides the best comprehensive, coherent and simplest model for linking diverse and unrelated facts in a useful and pragmatic way.
4. **Recontextualising – (generalisation)** moves from the lived experience to one that we as humans can identify with.

Nevertheless, Ritchie and Spencer (1994) among others, argue that the visibility and accessibility of the qualitative data analysis process is important. It is important that readers know how the findings of qualitative research have been obtained. Likewise,

Halpern (1983) introduces the term "audit trail", which enables another investigator to follow the cognitive development of a project. Although this is a good idea it seems unlikely to be possible at a very detailed level as most of these developments are cognitive and would be hard to make explicit. However, the method of analysis is described here as clearly as possible and the interpretations derived from the data are made as transparent as possible in the chapters that follow.

The analysis process follows that given by Morse (1994), see Figure 3-3 – it is also similar to that outlined by Colaissi (1978). As I have said the aims of the research and the interview questions asked derived from my own reflections of working in I.T. and from the literature reviewed. In a sense the analysis in terms of interpretation started here. However, with the analysis of the data I first transcribed the interviews in order to have all the data readily available. The transcription also helped me to gain a preliminary understanding of the data. Each interview was then summarised.

The summaries consisted of up to three pages of relatively detailed notes (the transcripts were between 5-19 pages long). The notes were my interpretation of the main points the interviewee had made. For each transcript, statements and phrases relating to the interview questions were extracted and grouped under headings. Any repetitions were omitted. The statements and phrases were rewritten to clearly express their meaning. These summarised interview interpretations were returned to the respective interviewees for validation. Any comments and corrections were incorporated into the data.

The individual summaries were taken and combined according to common themes. Comparisons were made between departmental and company managers and between those and other managers. Similarly, I compared the data from I.T. departments in public with that in private organisations and that of small with large I.T. companies. However, I started to feel that I had become far removed from the original data. Consequently, I went back to the transcripts and made lists of actual quotes for each theme.

The comparisons within and between listings produced "theories" which were checked with the original transcripts to see if the differences noted were really reflected in the transcripts and whether any contradictions or additional features had been missed.

After all this sorting and resorting I knew my data extremely well. However, the data that I knew were no longer the original interview data or its transcripts but the categorised data that I had spent so much time organising and re-organising. Tesch

(1990) refers to the way the original data becomes viewed within the context of its own categories rather than within its original context. It is these categories that become central to the researcher's thinking (Dey, 1995).

I then started to write and rewrite different accounts of my data. According to Van Manen (1990) the process of writing and rewriting is fundamental to hermeneutic phenomenological research. For me this certainly seemed to be the case, the process of writing helped me to clarify my thoughts and to eventually work out what I wanted to say.

3.4.4 The Assessment of Research

There is debate over what constitutes appropriate criteria for the assessment of qualitative research. The discussion relates to the differences in ontological and epistemological positions associated with qualitative research compared to more positivist quantitative research. Hammersley and Bird (1996) argue convincingly that the same standards should be applied to qualitative and quantitative research. They propose two overriding criteria for the assessment of research: validity and relevance. Validity depends on the plausibility and credibility of the findings and importantly the plausibility and credibility of the evidence. Plausibility is defined as something that is likely to be true given our existing knowledge and credibility refers to the accuracy of the claim given the research context and method. Relevance is the importance of the topic to the audience it is aimed at and the contribution of the conclusions to existing knowledge. The relevance of my research is discussed in the literature review and conclusions. The concept of validity is discussed below along with potential threats to validity and the way that they are dealt with in the current research.

Validity

Validity is a measure of the credibility of the findings of a piece of research; that is an account is valid "if it represents accurately those features of the phenomenon that it is intended to describe, explain or theorise" (Hammersley 1992 p69). Although it is impossible to be absolutely certain of any knowledge we can nevertheless make a case for our confidence in our claims whilst recognising that we could be wrong (Hammersley & Bird, 1996). Our claims cannot be proved but they can be falsified (Popper, 1959).

A potential problem with validity from an interpretive perspective is the belief in multiple interpretations and therefore possibly multiple equally valid claims. As Giorgio (1975) points out, with phenomenological research it is taken for granted that

other interpretations are possible, although it is expected that if other researchers asked the same questions and adopted a similar viewpoint of the setting to that of the researcher, they would be able to see what the original researcher saw, whether or not they agree with it.

Validity is therefore relative, it can only be judged according to the purpose and context of the research (Maxwell, 1996). What then becomes important is to be as clear and explicit as possible about the research aims, the method used and the evidence and arguments that have been used to form an interpretation (Kvale, 1996). Also as the researcher is such an integral part of the research it is important that he/she is explicitly included and accounted for. Therefore, the role of the researcher in relation to the phenomenon under investigation should be made as clear as possible (Altheide & Johnson, 1996). Although a detailed account of the research process and the researcher will not make the research more valid it does enable the reader to better assess the claims.

Threats to Validity

Maxwell (1996) discusses two broad types of threats to the validity of qualitative research that are often raised: researcher bias and reactivity. Researcher bias is the danger that the researcher imposes their own framework on the study. Reactivity is the influence that the researcher has on the research setting and the consequent danger that the findings are "caused" by the presence of the researcher.

As for researcher bias, I am inevitably part of the research and the findings are certainly my constructions. However, the interviews and initial data analysis are my attempt to gain understanding of others' worldviews by keeping the literature in abeyance and "bracketing" (Hycner,1985 p281), as much as possible, my own presuppositions. As Morse (1994) points out "the goal is to become a wise and smart researcher not a directed one" (p27).

To ensure analytical validity in phenomenonological research is about Heidegger's concept of truth as unconcealment. It relies on the commitment and authenticity of the researcher and on their "moral" nature of the reflective process (Ray, 1994). Thus it relies on the researcher continually checking, questioning and interpreting the findings in light of theory (Kvale 1996). As Maxwell (1996) says "validity in qualitative research is not the result of indifference, but of integrity" (p91). Reactivity was discussed under the section on interviews and the research relationship.

The boxes below (Figure 3-4, Figure 3-5) consist of the specific ways that threats to validity were guarded against during data collection and analysis:

Figure 3-4: Data collection

- During the interviews, I tried not to impose my own definitions. I asked open questions, and let the interviewees speak giving them a chance to reveal their own perspectives.
- I tried not to appear, or indeed to be, judgmental.
- I tried to appear to be a novice who knew very little about what they were saying but was interested to find out.
- I told the managers minimal information about me so that they could not react to it.
- I tried to check my understanding by reflecting back to the interviewees both during the interview and subsequently. During the interview, I asked follow up questions in order to uncover meaning. After the interviews, I sent summaries of my understanding of the interviews back to the interviewees for their comments.
- The interviews were taped and transcribed so that there was as an accurate a recording of the meeting as possible.
- I interviewed a number of different respondents including some who were not I.T. managers in order to gain a variety of perspectives that could subsequently be contrasted.

Figure 3-5: Interpretation of the data

- During analysis of the data it was necessary to guard against selecting data that stood out to me and fitted with my existing or developing ideas whilst disregarding data that did not.
- Attention was paid to discrepant data and alternative explanations/understanding were considered (constant comparative method, Glaser & Strauss 1967).
- In addition, interpretations were constantly compared back against the data and the data against the interpretations.
- The resulting interpretations include quotations from the interviews to illustrate and provide the reader with examples of the manager's own terms and meanings.

4 ANALYSIS

This analysis and subsequent discussion continue the exploration of the interplay and integration of the different areas outlined in the literature review – namely the organisation, the occupation, individual value and skills, the development of that value i.e. careers and the wider context and influences within which these other four areas are situated.

Consequently, I will begin my analysis of the data firstly by outlining the types of organisations that the managers interviewed worked within. Two distinct types of organisational environments emerge from the interviews: computer companies and computer departments. Secondly, the main part of the analysis reviews in more detail the actual skills and abilities that managers found valuable and the reasons that they seemed to find them valuable. Thirdly, I will look at managers' perceptions of the development of these skills and hence the model of a computing career that managers depict.

The first section of the analysis thus provides details of different types of organisational context within which to situate the analysis of valued skills and careers of the other two sections. The analysis shows that managers' demands and requirements about value differ according to their type of organisational context. However, despite these differences it also shows that the skills and careers that managers are describing are patterned and seemingly given structure and meaning, irrespective of organisational context, by their understandings and connotations of various concepts. These concepts are centred on a technical vs. managerial dichotomy.

4.1 ORGANISATIONAL ENVIRONMENTS

Two distinct organisational environments are presented below, that of the computer department within a host organisation the main business of which is not I.T. and the computer company the main area of business of which is I.T. These two organisational contexts are essentially ideal types or archetypes (Cooper et al, 1996). Archetypes provide a useful way of integrating the seemingly defining features of a group of similar organisational contexts but allow for the fact that an organisation that exactly matches the archetype described may not actually exist.

From the interviews, public and private organisations did not seem to be particularly distinct organisational contexts. The two smaller I.T. companies did seem somewhat

distinct but this seemed to be to do with them as specific organisations rather than their size as such (see comments at the end of this section).

4.1.1 I.T. Departments

I.T. managers were responsible for providing centralised I.T. services to other parts of the organisation. This involved providing maintenance and support for centrally managed computer systems. Within I.T. departments, staff were employed in help desk, desktop support, networking and technical support roles. They were also employed to some degree in systems development work that varied from customising pre-packaged systems to maintaining proprietary software.

Dilemmas over the management of I.T.

Departmental and user managers' comments reflected the changes in the I.T. industry outlined in section 2.1.2. For instance, the role of I.T staff within these organisations had changed over recent years. I.T staff had been back-room people who looked after large mainframe or mini computers on which payroll and possibly other administrative functions were performed. I.T. was now much more pervasive within the organisation and I.T. staff were very much more visible than they had been previously. Users now viewed I.T. staff as helpers, advisers and interpreters. Departments that once concentrated on the technology itself were now service and user focused.

The comments of managers also showed their organisations' dramatic increases in I.T. usage and their business' growing reliance on I.T. For instance, one manager commented "the number of users has spiralled massively over the last few years" and left the I.T. department "stretched too thin" (DHCU). Similarly, another commented:

> The problem is that we have increased our use of computing so much in the last 10-15 years or whatever and we have all these systems. The more systems that you have the more opportunities there is for things to go wrong. ...the general point is that we are so reliant on it now.... It's catch 22 the more systems that we implement, the more reliant we are on them.... It gives us a lot more power and a lot more information and ways of running the business but without them we are lost so it is like a monster (DPhU)

There was a sense in this manager's and others comments of I.T. technology being somewhat out of control and unmanageable.

It was this increased I.T. usage, reliance on I.T. and perceptions of it being out of control that lead to the 1980s "strong business backlash" against I.T. mentioned in section 2.1.2. Host organisations worried about the escalating costs of I.T. and I.T. departments. In turn, this and the rise in managerialist and business values lead to the increased measurement and monitoring of departmental costs and contribution.

The departments in this study seemed to be suffering from these kinds of increased demands for results and added-value. As one user manager commented I.T. has "got to have meaning" for the host organisation and "a lot of money has been wasted on it or is perceived to have been wasted on it" (DHCu).

Companies and departments employed different methods in order to ensure value for money. One manager described their approach to I.T. management as a "federal approach" or "subsidiarity". He explained that:

> Generally, I.T. is pushed down to the lowest level that it can go. If one of these units wants us to look after their I.T. as well then I'll do that on an internal outsourcing relationship. (DEng)

This company made formal contracts between I.T. and other business units by which the department sold its services. A user manager in another organisation explained that he had service level agreements with the I.T. department, specifying things like response time, reliability of the service etc. However, he did not see the point of any actual money changing hands.

> They are responsible for ensuring that the service is there, that the service level agreements that we have in place are adhered to – achieved. .... It is an internally agreed service level between myself and I.T..... It is an agreement that we sign annually.... It is an internal sort of thing. There are no fiscal penalties; I mean why charge yourself money because it just comes out of the same bank account at the end of the day. But it is monitored on a regular basis and we do have a meeting about once every quarter.....to review the performance. And obviously, it points in certain directions if the performance is not up to scratch (DTelU)

The other departments relied on user group committees and other means of feedback to try to manage the interface between the I.T. department and the rest of the organisation. Departments seemed to make very little use of outsourcing. In all organisations, even including (DEng) who had the federal approach described above, the centralised I.T. department provided the majority of I.T. resources and support to the organisation. In this study, as in Dalgleish's (2000) case study of an I.T. department (see section 2.3.3), there were prioritisation tensions between the user departments and the I.T. functions. Overall, organisations faced difficulties in trying to measure and ensure that I.T. added-value. Their mostly tentative attempts to do so left the problem unresolved.

Lack of Resources

The host organisations' requirement that I.T. should add value left departmental managers trying to run their departments on tight budgets with the minimum of people. They presented a picture of departments doing the best that they could under difficult circumstances. The host organisations and users might have high expectations of the systems and services that they wanted but managers lacked the

money, time and people to fulfil those expectations. For instance, two departments had recently experienced downsizing (DPub, DTel) and a third manager feared future cuts in his department's funding (DHC). A couple of managers described the difficulties of running their departments with such resource constraints as "compromises" or "balancing acts" (DHE, DPub), which seemed to be a feeling shared by others.

I.T. departments were dependent on the wider organisation for their resources and their workload. Managers had to compete for resources with other departments and had to prioritise the competing demands made of them by different departments. They were working within a wider organisational environment whose main business and hence concern was not I.T. I.T. managers and their departments were therefore very much at the mercy and at the service of the wider organisation. Managers of user departments, whilst understanding the resource constraints faced by the I.T. departmental managers, nevertheless, had their own concerns and sometimes felt that they were not getting enough support or not getting support quickly enough from the I.T. department.

> the users would like everything to work perfectly smoothly and there are hiccups all the time and they don't *(work perfectly smoothly)* and there are always problems, back logs of jobs that need doing in every department and every department screaming to get theirs done first..... They try to provide the best service that they can and it isn't always good enough for the users and the users will naturally complain. (DHEU)

Although departmental managers probably would not have described it in such strong terms, departments did indeed appear to be Dalgleish's (2000) "group under siege" (p4, see section 2.3.3)

Managers realised the frustration that the lack of resources could cause for staff. For instance, people might be forced to produce work that was below standard:

> It is really frustrating to have to do work badly and most people have to do that because there isn't enough resource to go around.... So, quality sometimes has to go out of the window. And that for a professional is very hard. (DHE)

or they might prepare themselves for a project which subsequently had to be cut

> We have had situations where there has been a 7% dip in sales and we are asked to provide a 7% dip in the things that we are doing.... then that caterpillars.... if you have trained someone up to deliver that it can cause a frustration. The plans were mapped out and there is disappointment because they can't put into practice what they have been trained to do or encouraged to do. (DPub)

Generally, staff were spread too thinly. They frequently had multiple primary areas of responsibility and were sometimes providing a secondary backup to other areas. In some areas, people were spread so thinly that departments might be relying on a single expert and would face considerable problems if that person left.

The number of different activities that a department was involved in, the reliance of the rest of the organisation on the department's systems and thus the high level of service expected meant that departmental staff were under pressure and in danger of being overworked. Often staff worked longer hours than contracted. This might involve some weekend working and out of hours working. Some departments provided 24 hour a day, 7 day a week support for some systems. Departments were therefore constrained as far as resources went but not as far as their department's role was concerned.

Non-Glamorous

Their lack of resources and their locations within organisations whose main concern was not I.T. meant that departments were usually not providing state of the art equipment or the latest software. They were likely to wait before upgrading their hardware or installing the latest software releases. This was sometimes frustrating for users who wanted the latest technologies. It also meant that staff within I.T. departments were in danger of becoming relatively out of date. As one manager explained:

> One of the challenges for the business is keeping people up to date. I wouldn't say that from a European point of view that we are particularly state of the art. Most of the applications that we develop today we could have technically developed 10-15 years ago. There is a danger that people will not get involved in the latest technology as soon as they would like to because of the way that we have chosen to operate. One or two people but not many look for careers outside. I don't think that we have had many/any that have left for that reason. So people can get technically out of date and what we seek to do it to keep people technically up to date compared to the technology that we are using which is not necessarily the technology that the rest of the world is using. (DPh)

Not being at the forefront of technology, the less rapid pace of change within departments combined with lower salaries meant that some managers viewed I.T. departments as less glamorous than I.T. companies. Nevertheless, many managers worried that it would be high salaries, rather than working with the latest technologies or more interesting work that would tempt people away – although as one manager commented, high salaries and up to date skills were connected (DEngU).

One department had adopted more leading edge technologies. It found that it was contributing skills to, and competing for skills in, a market place that its host company was not in. Given the "buoyant" I.T. market place, the relative scarcity and the high salaries attached to those skills they were having great difficulty retaining people with experience with that particular product.

> the market place is paying exorbitant figures for the skills and people have looked at a merging company and looked at the market place and said I can earn magnitudes of difference - not percentages, its magnitudes of difference in salaries - if I join the SAP consultant brigade in the market place whose market is selling applications software and

> our market place is and always will be we an IS function inside a company whose core business is not I.T. Retaining those sorts of skills we're finding a constant drain, well attrition at the moment. (DTel)

Other departments found themselves losing people to become year 2000 contractors and consultant. Again, market demand meant that people could be lured away by large salary increases. Even if a department had not experienced such problems managers were concerned that it could be a problem in the future.

Low Turnover

In spite of the literature that suggests otherwise (section 2.4.1), and despite the potential problem of losing people to organisations that could afford to pay much higher salaries, all but two managers out of the seven (DTel, DBa) reported low turnover of staff. It might be that many staff who remained working within I.T. departments for any length of time became increasingly out of date and therefore became less marketable and hence less likely to leave. However, low staff turnover could itself be a problem, making the department "staid" (DPh). Staff turnover gave managers the opportunity to bring in fresh people with new skill sets. Two managers did feel that staff turnover was too low (DHE, DPub)

Promotion, career and salary constraints

Low staff turnover in conjunction with the relatively small work-group size of the departments also had a price in terms of career and promotion. Although new jobs were sometimes created, staff within departments usually had to wait for people to leave to gain promotion. Managers used terms such as "dead men's shoes" (DHC, DHE) and "vacancy stoppage" (DBa) to describe promotion within their departments. Departmental managers wanted to give staff the level of responsibility that they were capable of handling but given the context within which they were operating this was likely to mean that people had to wait.

> Giving people adequate responsibility is extremely important. Given the business context in which we are operating then we try and do that as much as possible. We have to fulfil people's needs as best we can given the opportunities that we have. So inevitably, some people will be disappointed but you hope that their turn will come round with the next project or whatever (DPh)

People's careers therefore might not move forward as quickly as they potentially could. In addition as well as the low turnover and the size of departments people had to realise that their role within the overall organisation was also relatively limited.

> your role is to provide a service to the organisation not to develop new applications or take on major responsibilities and you know that your career will be somewhat limited. You will be in a central services unit and that is it. You may progress up within it. (DHEU)

Mostly staff did not seem to transfer within the organisations to other positions outside the I.T. department. There was a sense of I.T. staff being slightly isolated and cut off

from the organisation as a whole. In addition, whereas I.T. companies were linked to the I.T. industry through their work and via their competitors and partners, departmental I.T. staff also seemed cut off from the rest of the I.T. industry. Departments and their staff seemed to lack close integration with a larger coherent whole. Departmental staff thus seemed to experience the "enforced localism" described by Allen (1991, p6) in which they were somewhat cut off from both their employing organisation and their occupation. In particular they appeared to lack strong links with occupational networks which are likely to be important for knowledge acquisition and transfer and for individuals' careers (see section 2.3.5)

All departments had career grading systems and four (DTel DBa DPh DEng) of the seven departmental managers described some sort of dual-ladder type system (Allen & Katz, 1986) whereby technical staff could progress without necessarily taking on management responsibilities. Although again, the fact that departments were relatively small groups limited the implementation possibilities of such systems. Notably these four were larger departments with 50+ staff. In addition to the somewhat limited career opportunities within the departments, some managers described the limited opportunities for people to move from I.T. departments into the higher management levels of the organisation. It seemed that I.T. departments were seen as service providers and their management were not considered as senior management material – they did not know about business in general and in particular were not part of the host companies business. Again, there is this sense of enforced localism.

> you do get a lot of parochialism. I mean I've got a good guy and I know that I am the limit for that guy really money wise at the present... He has certain attributes that are very special and could finish up in directors' seats but it is getting them past the blockage... He's got to move on. I have got to progress him into other areas of the business because I haven't seen an MD come from an I.T. function not in this company. It is a commercial driven or engineering driven background. He has got to move into a role that is recognised in those areas and I have got to make that happen. (DTel)

Departmental pay scales were not necessarily flexible enough to enable the department to increase the pay of their more able and valuable staff. Salary levels could be set either too high or too low for "historical" reasons. For instance, one manager explained that some people were "paid more because they had been here longer, they know quite a lot but are just not pushing anymore" (DBa). Some departments had bonus systems that might partly redress this imbalance (DEng DPub DTel DPh DBa), however it was not clear that these functioned particularly well in rewarding people that managers thought should be rewarded.

A Traditional, Supportive Environment

Although I.T. departments did not have the most up to date equipment, pay high salaries or have particularly good promotion prospects staff seemed to remain in the departments for a considerable time. There was the perception that although it was not cutting-edge computing work, working in an I.T. department was a "nice" sort of I.T. job.

> It's a nice place to be. It has always had a very nice atmosphere in computing services. I think that working in computing services is one of the nicer type I.T. jobs because you are interfacing with a larger community which has a social life, people tend to be friendly. (DHEU)

Managers gave the impression that I.T. departments were more traditional work places than I.T. companies in that for instance they provided a supportive environment in which people were looked after, given job security and a company pension.

> we are fairly traditional. I think that the valuable people are those that can see that there is a longer term game plan and that job security is perhaps a factor and pension schemes and working in a supportive environment. (DEngU)

4.1.2 I.T. Companies

It was very apparent from the interviews with the I.T. company managers that their companies were in the business of selling. Some sold software products and services, others sold just services. The services provided included advising clients, outsourcing and managing customisation and integration projects. Among the managers interviewed there was very little involvement in the hardware side of the I.T. industry.

Successful, Dynamic, Commercially driven companies

My impression from the interviews with I.T. company managers was that they saw their organisational environment in a very different way to that of I.T. departmental managers. There was not the same preoccupation with lack of resources and on the resulting juggling of people and priorities that was indicated by the interviews with departmental managers. In contrast, company managers spoke in terms of making money and being successful. In keeping with wider reports of growth within the industry (Bednar & Bissett, 2001) most managers reported "phenomenal" growth over the past few years and they expected that to continue (the exceptions were C and SCMd which did not mention their rate of growth).

Unlike the departmental managers, company managers presented their organisations as commercially driven organisations with "sales cultures" (CP). The organisation's success depended on making money, which in turn depended on selling and winning

and keeping customers. Often the staff within the companies who consistently earned more were the successful sales people. Sales people might be on a relatively low salary compared to others in the company but could earn large bonuses depending on whether they reached their sales targets. This sales culture meant that the companies were under pressure to perform and this pressure in turn was passed on to managers and sales people but could filter through the company affecting everyone within it.

> Everything is sell. The company's been in business 21 years, they're a 4 billion dollar company now and the only reason that they are that successful is that they've managed to get out there and sell it; never recorded a loss in 21 years. You've got to make your quarter targets. The sales people are carrying a huge load. The UK generates £200 million in revenue and failure is not a concept that they understand, condone or even listen to here. Everyone is exposed to that pressure of sale. (CSwP)

I.T. companies, although in the computer business, were primarily in the business of selling. The integration with the rest of the industry and this focus on commercial success seemed to give the company managers a sense of direction and a clear purpose that departmental managers did not have. Unlike departments, companies were part of a wider whole that not only included the I.T. industry but also links with their customers' organisations and industries.

Company managers stressed the need for their companies to be ahead within their market areas. Hence their companies needed to be aware of their market and able to respond quickly to changes within it.

> we are a centre of excellence in financial solutions based around a core product called xxxx.....The finance sector is the most competitive in the I.T. industry. It is extremely fashion conscious - 3 billion spend per annum.... It is a big fight out there for business so you've got to be aware of the market and what is going on technically, you've got to have a good business sense, you've got to be market and customer aware. It is only like that we will make sure that we are building in the differentiators there that will get us a little bit ahead to win the business.... So as far as business planning goes you've always got to make sure that we continue to invest in the business to keep us at the edge there. (CFi)

Managers emphasised the superiority and importance of their companies compared to competitors. They spoke of the difficult and challenging work their companies performed and their companies' involvement in large, complex, critical projects that commanded huge sums of money. Their companies hired the best people, provided specialist expertise, were centres of excellence and attracted large, important client organisations.

Companies were presented as state of the art within their market areas. Those areas were rapidly changing and managers described the need for their companies to be flexible and dynamic enough to be able to respond to those changes. For instance, one company prided itself on its loose structure and its ability to reorganise itself rapidly.

> One thing that the company does is reorganise itself very quickly, which can be painful as most people don't like change. The biggest fear in the company is that we'll become a big organisation in which people put barriers up and become inflexible - we have a structure which is a bit loose - we put together teams to achieve a particular end. (CSw)

Another manager said that her company was "continually changing or stretching itself" (CEng). Likewise a couple of managers (CSw, C) described the way that their companies put together virtual teams where people would come together for particular projects and then the team dissolve. Thus for managers, as in the literature (Mabey et al, 1998; Kanter, 1993), being a successful company seemed to be linked with being dynamic, flexible and responsive to customers and the market. More specifically these were also features linked with being a successful knowledge company (Scarbrough, 1999).

Demanding, "rewarding" work

Given the pressure on the company to perform, staff often worked long, non-office hours. Also for many their work could involve a lot of travel both within Britain and also worldwide. Managers recognised that they often demanded a lot from people both in terms of their work and in terms of the impact on people's home lives. However, unlike departmental managers, company managers presented this an integral part of the job and unavoidable. The high salaries and bonus system were perceived to compensate staff for this.

There were essentially two elements to the monetary rewards of company staff. Firstly, basic pay was supposed to reflect a person's general worth or market value. Thus when staff learnt new skills and developed through experience their basic pay would rise. Secondly, there was the bonus, which was supposed to reflect a person's contribution over a particular time or the achievement of specific objectives during that period. Company managers frowned on rewarding people for age or length of service believing that monetary reward should reflect a person's performance. One manager spoke of how they were moving to a system where objectives would be set in advance rather than the company's past system of just trying to assess worth without specific criteria to compare that contribution with. He stressed the importance of "measurable," "performance related" pay increases and commented that "We spend a lot of time making sure that people are being rewarded similar to how they contribute to the organisation" (CFi). This seemed a major concern of company managers in general and fits in with a wider managerialist agenda outlined in section 2.1.1).

All managers seemed aware of salary levels within the industry as a whole and were keen to make sure that their companies' salaries were competitive. One manager

explained that they had lost people when their salaries got out of sync with the industry as a whole and told how they now had a "formal bench-marking procedure" (CP). Another explained that they paid at levels higher than average for the industry because they wanted the best people (CSw). So, salary levels were seen by company managers as an important device in order to secure staff of the appropriate level. More generally this shows company managers attention to the wider environment; an attention that departmental managers did not demonstrate.

Skills Shortages

Like departmental managers, company managers perceived the I.T. industry to be one with high staff turnover. However, again they reported relatively low turnover of staff within their organisations. One manager commented: "a lot of people have been here for 10 years" (CSw). Like departmental managers, company managers wanted to keep turnover as low as possible but unlike departmental managers they did not fear becoming staid because turnover was too low. The problem for company managers was presented as getting people with the appropriate skills rather than retaining them.

Company managers, like departmental managers, perceived there to be skills shortages in the I.T. industry. One manager noted this difficulty and the dilemma of either hiring expensive contractors or retraining existing staff.

> when we win a major bid the resourcing is quite hectic in terms of trying to get people on board. We also use a lot of contractors and we are quite happy for that to be the case. With transient skills they have a got a market value with the skills and technical knowledge that they have got. It is therefore their responsibility to keep their technical knowledge and marketability up to date. It is quite a hard balance because you have to pay quite a lot for that. But there are some core skills that we know that we need which will be more transferable which we definitely invest in and it is a challenge to us to keep these people (CP)

Developing relationships with third parties in the form of partnerships, joint ventures or arrangements with individual contractors or contract companies were also methods other managers mentioned.

Although some managers thought that training and development were areas that the I.T. industry was not particularly good at, managers reported lots of opportunities for learning new skills within their companies. However, it could still be difficult to keep staff up to date technically. A couple of managers suggested that the scope that companies had for providing people with new challenges was linked to their growth (CSw; CEng). A growing company had more opportunities for its staff.

Lateral Career Growth

Many company managers remarked on the fact that they now worked in flatter organisations. Their companies might not have such fixed career paths as in the past and people were likely to be disappointed if they expected hierarchical promotion. However, as the managers interviewed in one company pointed out, there was a lot of scope for lateral growth.

> So I've seen a recognition of the fact and I've promoted the idea that you do have different sorts of people and there is more than one way to make progress than just everyone heading for the MD slot - a lot of people hop out along the way... The idea of management as a rigid hierarchy that you made steps up - it's not looked at like that in this company (CSw)
>
> We don't talk about growth, necessarily vertically we talk about lateral growth and where people are getting additional skills but not necessarily coming into a manager or team leader. So I think that all positions here have immense potential for lateral growth because of the nature of the company but vertical growth is very limited in how high people can go. (CSwp)

Companies no longer had the layers or management through which people could be promoted that they may have had in the past. In particular many managers explained that their companies had few general management roles; they now had many more managers who were functional and specialist managers and who had "professional" responsibilities as well as managerial.

Like departmental managers, company managers recognised the danger of career structures that forced technical people to move into management. All company managers said that they provided some sort of extended career path for technical staff to get around this problem.

The career structures of companies seemed to be a problematic area for managers partly due to the growth in numbers of staff that many companies were facing. On the one hand, companies did not want layers of management; on the other hand, they wanted to show that there was scope for career growth within the company. Also they wanted to encourage people to use their initiative, to be individuals and develop their potential; but this initiative and development needed to be useful to the organisation. One company combined a more traditional career path with a flatter organisational structure

> there is a structure so that people can develop their careers and be seen to be rewarded for that. The overall structure of the company is quite flat but the overall careers structure is quite hierarchical. So within the flat structure you've got scope - I suppose it's psychological partly these days but you do go up through grades and that is visible. (CFi)

Another company was changing their system of job descriptions and grades for what was presented as a more modern system of professional communities where development and rewards were tailored to certain sorts of professionals.

> we are actually tailoring the rewards, training and development and psychological deal is different for those individuals..... So the kind of deal that you set up is psychological based on intrinsic and extrinsic rewards is quite different depending on the population that you are working with (CP)

A third had a system whereby people, as they gained experience, would become more and more senior practitioners. Company managers it seemed, unlike departmental managers, did not have a shortage of career opportunities, there was no "dead men's shoes" and staff were promoted on merit.

Again the comments of company managers fit with the idea of the emergence of a new type of organisation (see section 2.1.1) which is flatter, de-layered and non-bureaucratic; and is consequently perceived to be flexible. However, they struggle with the problem of how to reward value within such an organisation. They seem to believe that their staff want some sort of hierarchical career system that makes their relative value visible and their companies appear to put a lot of effort into devising such systems.

The two smaller I.T. companies

Of the eight I.T. companies visited, two were notable for being much smaller than the other six (SCMd and SCEd) and indeed had partly been chosen to provide a range of company sizes. However, both companies seemed to me to be "somewhat odd" and probably not typical of small I.T. companies. For instance, one company was employed solely by a government department and had only recently entered into the commercial world. The other had been part of a local authority and had only been a separate company for 18 months. Also both companies dealt with very specialist software. Neither of these smaller companies fitted with either of the above workplace descriptions, rather they seemed to fall somewhere between the two. For instance they did not seem as aggressive and businesslike as the other companies but neither did they seem to lack resources, time or people to the same extent as the I.T. departments. Like departmental managers, the work-group size of the small companies seemed to limit the development that the companies could give their staff. Likewise, again probably due to similarities in work-group size, these two company managers, like departmental managers found themselves reliant on particular members of staff and thus very vulnerable to them leaving.

The rest of the analysis focuses on the distinction between departments and companies and leaves aside the issue of size of company

4.1.3 Summary & Conclusions

The table below (Table 4-1) gives a summary of main features of each type of work-group environment.

Table 4-1: Contrasts between the main features of I.T. Departments and I.T. Companies as work environments

	Departments	Companies
Role	Service providers	Sales
Description	Non-glamorous, not state of the art technology, lower salaries, less interesting work, less dynamic	State of the art within their market area; employed the best people; dynamic changing, flexible; responsive
Main Concern	Lack of resources including staff and finance, leading to compromise and prioritisation tensions.	Making money, selling, gaining customers, being successful – phenomenal growth.
Relationship to environment	Enforced localism - relatively isolated from their organisation, the I.T. industry and the environment generally.	Aware of environment - Part of a wider whole that included the I.T. industry and their customers' market(s) and the business environment generally.
Driving Force	User Driven - besieged by user demands. Multiple areas of activity	Self driven – Competitive, high company expectations. A sense of focus and sense of direction
Constraints	Dependent on the wider organisation that is cost and contribution conscious.	Needs to be independent and successful. High company expectations, pressure to perform
Organisation of work	Centralised – some project work, relatively small work-group size	Project or client centred.
Description of Work	Fire fighting - spiralling complexity, amount and organisational importance of their work	Challenging, important and difficult work.
Development & career opportunities	Slow career movement - dead men's shoes. Lack of opportunities to move into the host company and senior management positions.	Many developmental opportunities. Lateral growth – trying to reconcile flatter organisational structures with visible career movement and rewards.
Pay	Relatively low pay and inflexible pay system – often lacking ability to reward contribution.	High salaries - Efforts to ensure that pay was tied to market value and contribution
Turnover	Low, possibly too low.	Higher, recruiting the right people was a problem rather than retention.

All I.T. departments were service providers that appeared to lack resources. They and their staff were pulled in different directions trying to reconcile the competing demands of different user groups. They tried to provide stable services that were as up to date as possible within the resource constraints they experienced. They could not afford to pay the high salaries that computer companies paid and felt in danger of losing staff who would be lured away by the temptation of more money. However, staff turnover was very low and the departments often would have liked the

opportunity to bring in fresh people. There was not a great deal of scope for staff to change jobs and vertical promotions or large pay increases were unlikely. However, departments were considered nice places to work unlike the "nasty" high-pressured world of business.

The I.T. companies were in the business of selling. They were all commercially successful and many were presented as experiencing tremendous growth. Typically, staff were under some pressure, working long hours and possibly being required to travel. In return, staff received good salaries and could earn large bonuses. Staff turnover may have been higher in the I.T. companies than in the departments but did not appear to be too high or problematic. Company managers reported skills shortages and sometimes companies formed relationships with external organisations to overcome these difficulties. With the exception of the two smaller companies, the companies were portrayed as providing dynamic and challenging environments with many opportunities for staff to grow and develop. The possibilities for development and increasing earnings were presented as almost limitless, only being constrained by the abilities of each individual – an example of du Gay's (1996) enterprising self or Burrell's (1996) generation X (see section 2.1.1). These companies had different formal career structures but all were presented as much flatter organisations than they had been in the past and thus had fewer opportunities for vertical promotion. The career structures were also designed to provide some type of dual-ladder type system whereby their staff could make progress without necessarily moving out of their technical areas. All company managers presented their organisations as leading companies in their area, even if that area were very small and specialised.

The interviews with company managers showed a focus on business and market values. I.T. companies were presented as the "new" organisations described in section 2.1.1. They were lean, flexible and dynamic. They could respond quickly to market changes and customer needs, and indeed their success was perceived to depend on this. Goals and targets were set for individuals as well as organisational units and what sometimes seemed like considerable pressure was placed on individuals and units to perform and deliver. There was a great deal of importance placed on measuring and rewarding staff for their contribution to the organisation. The managers that I interviewed were well versed in this managerial-type discourse that accompanied this style of organisation; although their focus was on selling and the market rather than necessarily the customers per se. Also there was little talk of efficiency rather more an assumption that if everyone was contributing and working towards set targets then this would lead to efficiency. Within such as environment

more bureaucratic-type organisations were perceived as large, inflexible, old fashioned and inefficient.

Conversely, departments seemed much more traditional and bureaucratic in style than companies did. Staff had jobs with job descriptions; they were on pay scales rather than pay being a measure of market value or organisational contribution. Mostly staff seemed to have job security and indeed departments often seemed to be places where people could "settle." Departments were somewhat hierarchical with responsibility for anything more than technical support seeming to reside with management, particularly with the departmental managers themselves. Departmental managers although from their interviews obviously aware of managerialism and the pressure on their departments to be "business-like," appeared somewhat remote from this discourse. There was the sense that they were not really in business; that they did not really have a market as such or really serve customers per se. They had users rather than customers and provided support based on need rather than sold a service. However, although they were not necessarily focused on customers they did seem very user and service oriented.

Departments appeared to somewhat lack clarity and coherence. There did not seem a way to measure the department's or individual staff member's performance; whether the departments were successful or not seemed more a matter of opinion than targets met. They were subordinate to the host organisation. They relied on their host organisation for their role and that remained ill-defined and wide ranging. Their resources were determined by the host organisation and seemed largely neither performance nor task-related. However, although somewhat ill-defined as far as their role went, departments also seemed rather fixed and bounded in themselves; for instance, neither the department nor their staff seemed well integrated with the rest of the organisation and they appeared largely unaware of its business. Although departments did not seem to place the same pressure on staff to perform and to achieve they still seemed stressful places to work, indeed their stress partly came from the lack of direction that they had and gave to their staff.

In this section, these descriptions are my impressions gained from the interviews with managers. This does not say anything about how others see these organisations or indeed the degree to which the managers interviewed "believed in them." Nevertheless, from the interviews I.T. departments and the I.T. companies appeared to be very different work environments. It seems likely therefore that the departments and companies would also need people with different skills and attributes and would expect them to follow different careers. This is investigated in the following analysis.

4.2 THE CONSTRUCTION OF VALUED SKILLS & ATTRIBUTES

4.2.1 Introduction: Ways of Knowing, Managerialist vs. Technologist

Throughout the literature reviewed in section 2 various dichotomies arose between different areas – see Table 4-2. The computing occupation is criticised for being too closely aligned with one side of the dichotomy and it is argued that it needs to be more closely related to the opposite area. Although there is not a neat or absolute alignment between all the areas on each side of the divide, these dichotomies often reflect a tension between business, managerialism, commerce and market forces and the more absolute, fixed and "harder" areas of science and technology. This might also be viewed as a tension between mode1 and mode2 knowledge i.e. a tension between two types of knowledge and two ways of knowing (Gibbons, 1994).

Table 4-2: Dichotomies identified in the literature from section 2

Them	vs.	Us	Masculine	vs.	Feminine
Machines	vs.	People	Engineer	vs.	Consultant / facilitator
Technology	vs.	Tools	Worker	vs.	Manager
Enthusiasts	vs.	Pragmatists	Hand, manual	vs.	Head, conceptual
Technical skills	vs.	Interpersonal skills	General rules & principles	vs.	Contextualised knowledge
Mechanistic	vs.	Romantic	Routine	vs.	Complex
Industrial age	vs.	Information / knowledge age	Practical	vs.	Cognitive / intellectual
Centralised control	vs.	Decentralised	Bureaucracy	vs.	Market forces.
Objective &, scientific.	vs.	Subjective	Rational and logical.	vs.	Intuitive, feeling, emotional
Competition	vs.	Collaboration	Professional	vs.	Commercial

This tension, between what I will refer to as the managerialist vs. technologist perspective, was also a major theme in the interviews of my managers – the analysis shows how individual value within the I.T. occupation may be interpreted, structured and defined by managers use of these competing poles. These contrasts provide managers with resources on which to draw when constructing definitions of individual value. They provide managers with a shared reality, which although they may believe in to different extents, they all seem to understand and to use. This indicates a fundamental defining factor about the I.T. occupation at this point in time and can be seen to be a significant factor in the way that it has developed over time (see section 2.1.2).

In accordance with the above distinctions the managers interviewed valued three main types of skills: technical, interpersonal and business. Although business skills imply commercial skills, they are also meant to indicate skills associated with the

organisation's business, which could for instance include the business of higher education within a University or the business of health care within a Hospital. These three skills sets were described by managers in relation to one another. Business skills required a particular subset of interpersonal skills and thus seemed to be a higher skill set that had certain interpersonal skills as a prerequisite. Technical skills were described in opposition to interpersonal and business skills and were devalued by this opposition. Managers also valued certain qualities in their staff – they valued doers and achievers, people who were flexible and adaptable and those who were stable and committed to the organisation. In turn, managers attributed these qualities to individuals according to the individual's perceived skills i.e. whether they were perceived as being more technically or business orientated.

The box below (Figure 4-1) illustrates some of the specific skills that managers mentioned grouped into the three categories given above. That is not to say that every manager who, for instance, valued business skills wanted someone with all the qualities listed. The business and interpersonal skills overlap, as already noted. Business and organisational skills are grouped into one category because managers tended not to clearly differentiate between them. This grouping also includes managerial skills. It seemed almost assumed by managers that these three potential different grouping of skills would go together, e.g. a person that has business skills would also have organisational and managerial skills.

Figure 4-1: Categories of Skills

Business / organisational Skills

How an organisation works. Organisational politics. Understanding of Applying I.T. to the organisation. Understanding the customers business and environment (politics, constraints). Commercial awareness. Managerial skills. Time management. Project management. Sales orientated. Risk and change management. Ability to act strategically.

Interpersonal Skills

Explain, articulate, mediate, negotiate, advise, interact, relate, interpret, listen. Customer relations skills, build trust and relationships, create an appropriate image, maintain credibility. Being a team player and able to work in virtual teams. Leadership

Technical Skills

Programming, systems understanding, being up to date technically. Knowledge/experience of particular programming languages, operating systems, user software or hardware.

4.2.2 The Value of Technical Skills

Not surprisingly technical skills were valued by all the managers interviewed. However, it was as if they were the least that was expected of a valued I.T. person. As one departmental manager put it: "we are the techie experts" (DHE). I.T. companies could be regarded as even more the techie experts, relying as they did for

survival on convincing customers of their technical superiority. However, there was not a simple linear relationship between technical expertise and value – increasing technical expertise did not necessarily also mean increasing value. In-depth technical skills were associated with the stereotypical technical personality who was only interested in things technical to the exclusion of all else (Turkle, 1984 and Hacker, 1981); and particularly problematically for managers, to the exclusion of people, users and the organisation.

The "extreme techie" (DHE) or "pure techie" (DHE; DEng; CFi) had very in depth technical skills. There seemed to be limited scope for such a person within most organisations.

> Techie tunnel vision. Such a person would be problematic if had any - some tend in that direction - but we try to select out when we recruit. People with a total obsession with interesting things in computers are not much use. They are impossible to manage. Rarely user focused. In a service you've got to care about what the users want. You can spot them because they babble on about technology not users. In a larger environment maybe you could afford to have 1 or 2 such people but they are not much use because they lose interest at delivering a finished product. They get bored after it ceases to be technically interesting – they can't turn it into a smooth product. (DHE)

Departmental managers particularly had no or very little use for such a person. There was not the scope for such people within I.T. departments: they were relatively small units compared with most I.T. companies and they did not have the resources or capacity to have people investigating and experimenting with interesting technical things. Also the departments' aims were to provide a reliable, stable service rather than to create anything new or leading edge. Consequently although mostly they did not contain extreme techies, the people within departments who were most like this techie stereotype were lower down the organisation – technicians, who according to one manager, were likely to be found in computer communications and networking roles (DEng).

Company managers had more scope within their organisations for such a person. They were interested in being leading edge and ahead of competitors and such people might therefore be useful to them. They could tolerate lack of other skills as long as the person's technical skills were extremely good.

> We have a development centre in Berkshire where we employ 50 software engineers – these are deeply technical roles – they need deep technical skills. They don't need a personality, they don't need to talk if they don't want to. (CSw)

Such people were described as the "backroom boys" (DEng) and "back-room technical people" (CFi). They would work in the background, shut away, developing software or solutions but not meeting customers nor necessarily mixing a great deal with others in the company. However, as one manager admitted they could be crucial

to the success of a development or a project (CFi). Again though, the number of such people that a company needed would be relatively small compared to their total number of staff.

In keeping with the typical technical personality (Von Glinow, 1988; Couger, 1988 & Mclean et al, 1991), or those with a technical/functional career anchor (Schein, 1993) one manager interviewed described the more highly technical staff's concern with the challenge and interest of the work itself and with having the latest equipment to do that work. The company's technical people were also less concerned with hierarchical position and job security.

> for a systems engineer it *(what we are looking for)* is..... developing reusable products and code, not re-inventing the wheel all the time because it is technically challenging and interesting - these things are drivers .... The fact that they are seen to be successful and senior doesn't seem to be so important for them as for instance sales people. They are more concerned with having the technology to do their job properly. Have they got the right speedy equipment and software to use? Is what they are doing interesting and challenging and intellectually stimulating? Security of employment is not a big deal for our technical people (C).

Similarly this manager noted that the best technical people did not necessarily want or need jobs within organisations and might be happy to work as contractors moving from one interesting and challenging project to another.

Organisational and technical goals needed to be aligned. As documented in the literature and affirmed in the interviews this does not seem to happen naturally; it requires some effort on the part of management. Technical people's interests might run away with them and they might lose sight of the organisational purpose to what they are doing. There is not therefore perceived to be an unproblematic coming together of the organisation and the technical individual (see section 2.3.2). A central source of job satisfaction for techies is the work itself (Couger, 1988, McLean et al, 1991). They may be less interested in commitment to the organisation (see section 2.3.2). A good reward for them would be interesting and challenging work (Schein, 1993) but this may be in limited supply within the organisation. This demand for interesting work might be particularly problematic for departmental managers with their resource and functional constraints. They may struggle both to be able to afford and interest extremely technical people.

Hiring contract staff meant that managers could get the latest technical skills without investing in the person. Managers had no responsibility for keeping the person up to date technically and did not have to live with the consequences if they were not up to date. More importantly, managers did not need to put too much effort into integrating them into the organisation nor into controlling them. Some of the managers

interviewed spoke of this as a way of distancing themselves and the organisation from hiring and updating difficulties.

As mentioned in the literature (Kavanagh, 1997) the transient nature of technical skills also makes them potentially less valuable. Likewise, as some interviewed managers pointed out, although some technical skills might be valuable today, due to their scarcity and the popularity of a particular technology, the rapid rate of change within the industry means that they are not necessarily of long-term value. Predicting trends in technology was difficult, and managers wanted to try to avoid the risk of investing in technologies and training that would be quickly surpassed. The avoidance of this risk was particularly evident in I.T. departments where resources were constrained and where technologies did not necessarily have to be the very latest. They seemed to follow the trend rather than attempt to set or predict it.

Also technical skills were devalued by some managers because they were perceived to be skills that could be gained by training and the level of skill achieved by training could be acquired by many people.

> The technical skills rapidly become out of date ..... we can train those people up very quickly. ..... So very perishable - you recognise that if you sent someone on a course or someone has acquired a particular skill it will last a year, 18 months. The general principles that they learn will last a lot longer but a particular technical skill is short lived. (DPub)

Overall, the I.T. managers did not have a high regard for training, particularly to develop technical skills. Some explicitly said that technical expertise was not gained through training courses or reading books. One manager explained that courses and books could only teach what everyone already knew. Also training did not involve applying the knowledge and skills taught or read about to specific areas - "you can't really read the knowledge you have to become involved" (DHE). Rather, gaining valuable technical expertise required practical experience, experimentation and exploration with the technology. It required people to have the interest, curiosity and drive to put in the personal effort necessary to teach themselves - "It helps a lot if they have a real desire to understand software" (CSw). In other words, it required an interest and aptitude in technology, a certain "techieness." Thus many managers aimed to give people personal development time, the necessary equipment and suitable work assignments in order to develop and maintain their technical expertise. Most managers appeared to believe in learning by doing and all managers favoured some form of work assignment as a means of development.

The managers interviewed seemed to be searching for something more than people who had been simply trained to perform. They wanted something deeper, more substantial, more fundamental, unique and longer lasting.

> Some people may be valuable today others might be valuable tomorrow, part of that value is to do with supply and demand economics and part is to do with changing technology. So the people who tend to be valuable are not so much the technicians but the good managers, who've got vision, who can develop strategic plans, deliver those plans and so on and in some cases you don't need the I.T. skills to do that. (DEng)

As the quote above shows, good managers could be considered to have something more, a longer lasting usefulness. Having a "natural" technical aptitude might also count as something more and meant that the person was likely to be able to adapt as the technology changed and therefore had some long-term value. Certainly, for the few roles that required deep technical skills being an "extreme techie" did count as something more and could make the person somewhat "unique." In both the cases of managers and extreme techies the person had something that could not easily be taught, possibly an almost innate quality or ability developed through years of experience.

4.2.3 The Narrow Techie Introvert vs. the Broad Business Extrovert

In keeping with the stereotype and the findings of previous research into the personality types of computer staff (Couger, 1988b and Lyons, 1985) some managers explicitly described technical people as introverts. They contrasted them with the more extrovert business person.

> some of the better people that we have, have just got that aptitude in the area *(I.T.)*.... an aptitude in programming is not an aptitude in business analysis and the person that is introvert and wants to continue in a technical career there is still that opportunity and scope but then there is the more extrovert person, the more business analysis type role..... A good business analyst would be outgoing, not technically channelled but has an awareness of the techniques, the methods, the personal skills. If you are looking for a person that is going to be a technical person then he is clued up with the current technologies, he knows the topic inside out, he's enthusiastic about what he is doing and he's actually a person who is a little more introvert but very much more focused in his interests. We look at two sorts of person there really and they are very different. ... And to be truthful software engineers at Xxxxx wouldn't make a good business analyst. You would want a different level or, or different style of person and a different intent from them. (DTel)

Business people were also regarded by managers as having a broader view whereas technical people had narrow and focused interests.

> I can offer to take a much broader overview. I still have something to offer them because they tend to see a little too narrowly at times. So I think the management skill is to have the broad understanding and to guide them where they might just have a little bit tunnel vision. (DHE)
>
> I think the requirement that we do have is for people to see the bigger picture because we are a multi-national organisation (DPh)

Although managers were careful to point out the value of all their staff when it came to a contrast between those with broader business as opposed to narrow technical skills then the broader business skills were more valued, as the manager above (DTel) says you want "a different *level* of person."

The narrow-broad distinction used here by managers was rather circular - by "broad" they meant that people demonstrated an interest in the organisation, its business and its goals and helping it achieve those. Whereas the "narrow view" of technical people meant that they did not seem interested in the business. Consequently, those with business skills were necessarily broad and those without were narrowly focused.

As well as the business analysts described by the manager above (DTel), sales people were another group identified within the industry that epitomised the business, extrovert side of this business/technical and extrovert/introvert duality. One manager described this "them and us" conflict that she witnessed between the two groups. She described how each group seemingly viewed the other either in terms of the flashy extrovert, wheeler dealer sales person with the big car and expense account or the bearded, techie wearing cut off denim shorts and open-toed sandals who should not be allowed anywhere near a customer. Although not necessarily agreeing with the sales people's view she acknowledged the importance of having technical staff who were more than just introvert techies. They also needed to be commercially and customer aware.

> We do a lot on commercial and customer awareness for staff.... I'm so glad that we have some brilliant technical people but we are largely a sales culture and a lot of our sales people don't appreciate the technical staff as much as they could... but trying to get the technical community to project themselves a bit more positively, a bit more professionally. They are qualified and accredited and can see things from the customer perspective, which hopefully will have an impact on the sales people's opinion of them because some of them are hiding their lights under a bushel. It's not like technical people to go boasting. But we could get a lot more impact with the customer if the technical people were just a little more able to promote their abilities rather than to shrug it off.... In some cases they are better than the sales people. Better being qualitative in terms of how they could deal with the customers, be honest and open and provide a brilliant solution (CP).

This manager's comments are important and echoed by other company managers. It shows that although I.T. companies may appear to be in the I.T. business ultimately they are commercial organisations that are in the business of selling. Technology comes second to this.

Business analysts and sales people were presented as the opposite of technical people. Technical people were often not perceived to be very interested in the business, particularly if they were in very technical roles. However, they were also tucked away in the background and so had less opportunity to integrate with others or to develop business values and awareness

> As a general rule those who go into the technical areas are there because they are excited by the technology and less excited by man management and business awareness and so on - so in that sense there's a lower development amongst people involved in communications and networking and so on. Application development is good for developing people because it involves developing systems for business. They tend to see more of the business, what people do, what they want, so they have a better chance of becoming aware of what the business is all about. (DEng)
>
> Difficulty with these types of people (technical) is that they tend not to be business orientated so ask them to choose something appropriate for a business and they'll choose the one that technically appeals to them rather than the one that meets the business needs. (DHC)

As Carole Brooke (1995) argues, managers' expectations of introvert I.T. people may be self-fulfilling. Also it is curious that whilst managers recognised the need for experience and on-the-job learning for technical skills they did not really see the lack of similar opportunities to develop interpersonal and business skills as a reason why technical people might appear introvert and lacking in business skills.

Business analysts and sales personnel were presented as essentially business people who were in the I.T. business. In the I.T. department at (DTel), business analysts tended to start their careers in other parts of the organisation, gain some technical knowledge and then work either within or closely with the I.T. department. This was in contrast to the I.T. people proper whose background was in I.T. and who had managed to acquire business understanding and people skills. These were the valuable I.T. people.

In this research, managers described technical skills in opposition to business skills: those with technical skills were thought likely to be deficient in business skills. Consequently, on the one hand managers almost seemed to regard the two skills sets (technical and business) as mutually exclusive particularly as they associated them with other opposites, i.e. introvert / extrovert and narrow / broad distinctions. However, on the other hand they employed people who had this combination of skills and valued them highly. Such people were hybrids who had this uniqueness and something more that managers were searching for.

4.2.4 Interpersonal Skills and the Gendering of Individual Value

Typically, technical people might be introverts and might not be particularly articulate but managers emphasised the importance of interpersonal skills amongst their I.T. staff. Unlike technical skills, they regarded interpersonal skills as being difficult or even almost impossible to train people in. Thus the fact that people could not easily acquire these skills through training meant that interpersonal skills had this almost innate quality that managers valued.

> But again, if someone is extremely proficient at VMS and they have the right kind of analytical experience then I can train them in UNIX. Whereas if someone knows UNIX backwards but is scared of talking to people I'm not going to be able to get around that with training quite so easily (CEng)

Company managers in particular tended to talk about interpersonal skills as valuable in the context of business situations and meetings as opposed to more personal interactions. Again, they were using this business lens to define certain interpersonal skills or certain ways of using these skills as valuable. These more business-like interpersonal skills were used with customers or others within the company to, for instance, negotiate, explain and persuade

> In our business, most people are customer facing so the crucial requirement is that people are good at interacting with others. We tend to be providing a service and that needs people we can explain to customers - some customers even though they have used the technology before may not understand what it can do for their businesses so we need people who are very good in people skills, who can work with customers and take them along a path which they need to go and in some cases are wary about going because the type of investment that we are talking about or the software that our customers buy a reasonable size order would be something along the lines of ½ million dollars. So if you are trying to get people to commit to that they need to have confidence in what you are advising them to do and that comes through building trust and to do that you need to ask questions that demonstrate that you understand their issues and that you are actually proposing a solution that they can adopt and that will be successful. (CEngP)
>
> Your looking for people who are good communicators - they are good listeners but can speak and talk appropriately as well; people who can convey an image of honesty and integrity; people who like to earn the right to move relationships forward; people who build relationships based on value and based on the value that they bring to the table themselves rather than trying to ride on the backs of others; people who are conscientious to bring value to every meeting that they go to (CC)

On the other hand, Departmental managers more often spoke of interpersonal skills in terms of good customer relations and customer services skills.

> People who are providing PC support are like a customer service function on behalf of I.T. to the rest of the business and so we put quite a bit of emphasis on that. But again it is not the way that I.T. people have worked in the past necessarily and it is changing those ways of working. Some people adapt to it quite easily and others find it a little more difficult to adapt. So customer service skills are very important. (DPh)

Departmental managers were providing technical services to people throughout the rest of the organisation and their staff had to be able to deal with these customers on a day-to-day basis. This interpersonal-technical skill combination was needed by people in customer facing positions. Which, given the service nature of the departments, was most of the staff – but particularly those people in desktop support, training and user support or help desk roles.

> The Training Manager, very similar, she deals with senior people on a regular basis. She needs to be able to communicate in a way that they feel comfortable with - as a layman not a technical person. Her main strengths are her knowledge of products and way she puts that over...
>
> She is one of the main reasons why we succeed - she changes all this I.T. stuff into things that people want to use and understand. (DHC)

A selling versus serving distinction arises between companies and departments.

In this sense, business skills required not only business knowledge but also the ability to demonstrate and use that knowledge by communicating with others in an appropriate business like manner about business type concerns. Thus some of the interpersonal skills valued by managers were also business skills and people needed those interpersonal skills in order to be recognised by managers as having business skills – interpersonal skills could be viewed as a subset of and pre-requisite for business skills.

Help desk roles were typical of the sort of work that required this combination of interpersonal and technical skills. Those fulfilling these roles might also be women. According to popular belief, women have good communications and interpersonal skills. Also research suggests that women are interested in the human side of technology (Rassmussen & Hapnes 1991) and, even in technical fields, they place emphasis on working with others (Bailyn 1987). Not surprising then that women within I.T. have been found to tend towards help desk, training and support roles (Hammond 1992). Likewise, most managers interviewed noted that the computing roles that often had a high proportion of women, compared to men, were training, help desk and other support roles involving contact with users.

However, although seemingly valuable, help desk staff were still not the highly valued hybrids that the managers most wanted. It could be that these roles were support roles and therefore not central enough to most companies - although it could be argued that they were central to the work of I.T. departments. A more likely explanation was that, it was not just the combination of the skills that was important but also the skill level associated with the role and the use that the skills were put to. A couple of managers mentioned that their help desk people did not have the depth of technical skills that some of the people in other roles needed. Also, their interpersonal skills were described more in terms of being "nice" (e.g. polite, cheerful and sympathetic) rather than in more active and dynamic terms. The help desk was a role that involved waiting for people to ring or come to you for help; it did not actually involve going into other organisations or departments and having extended face to face "business" meetings.

> we run a help desk and there are three very cheerful people on the end of the telephone - hour after hour, day after day - it is remarkable how sort of cheerful they always seem. They sort of perk people's lives up. If someone is reporting a problem that their printer is buggered up - how nice to speak to you. They are absolutely brilliant. Someone who is a very good technician who might be a bit dour but is nevertheless a good technician, we wouldn't want those qualities for someone on a help desk (DPub)

> you're dealing with people who are ringing up with technical queries who are not technically minded.... that requires communication skills as well as I.T. You've got to be sympathetic to the user, realise that they are not an idiot and keep them calm (SCEd)
>
> *(Talking about the qualities of a good user support person)* The user friendliness. The interpersonal skills. Their technical skills. Their ability to get to that level beyond the user, what my knowledge of the system is. ... .So analytical skills really and someone who can give me the comfort that something is going to happen. .... I think that the support person tends to be someone who hasn't got quite the level of analytical and logical capability as an analyst or a programmer or project manager but does have a broad understanding.... It is not the highest technical level of I.T. but it does have these added dimensions which you often don't find in I.T. people. (DPhU)

There was the danger that these, apparently more surface level technical skills and seemingly rather everyday interpersonal skills, could mean that people might become stuck working on the help desk (DPub). It may be that the technical skills of help desk staff were of the sort that could be easily trained and therefore were not of value to managers. Also the type of interpersonal skills needed and the use made of them are presumably very common and widespread amongst the population generally, particularly the female population. As Kavangh (2002) reports the social skills of women I.T. professionals were overlooked because they were expected to have them. They were also associated with less intelligence and less technical ability. He concludes that skills that cannot be codified – have clear criteria for measurement and assessment – like these social skills, are open to being ignored and devalued. It seems that women's social skills may not count as "skills."

The only surprising thing for managers was to find someone who combined both technical and interpersonal skills. However, this was not extraordinary or unique enough for managers to consider such people really valuable. Also business and organisational awareness were not mentioned by managers in connection with help desk and training roles. Consequently help desk staff did not have the right type or high enough levels of any skills set – technical, interpersonal, organisational or business - to be considered particularly hybrid or particularly valuable. Also if people did become stuck in such roles they would not even act as a stepping-stone for developing into a valued person.

Conversely, and also in keeping with the literature (Turkle 1988, Sproull et al 1994 & Kiesler et al 1995), many managers also noted that extreme techies were men rather than women.

> In all my career, I've never met a techie, techie women. ... You know the traditional image of the sort of person who is happy talking to their computer, and is very spotty and stays late at night. I've met lots of them but none of them are female. (CEng)

Not only were women not extreme techies but they also tended to avoid roles considered deeply technical. One manager said that women were not likely to be found in the more "intense of the technical areas" such as networking (DPub).

Another noted that women tended not to be in the "technical communications group, which had that slightly more engineering bias" (DEng).

> Computer maintenance - the people who fix computers on customer sites - that tends to be very male and so are the people who know about the really bottom level plumbing, like networks (C)

Women were "none of the fixers" (DHC) rather they seemed to be the "helpers."

Although technical and business skills appeared to be constructed as opposites it did not follow that because managers did not perceive women to be narrow techies that they therefore perceived that they had broader business awareness. Indeed some managers mentioned that women were also less likely to be found in business roles in for instance sales and business analysis.

> I think that the more outgoing business analyst roles are predominantly a male arena. (DTel)
>
> Its fascinated me particularly in our sales jobs that we don't get more women candidates and I don't know why it's like that because we're a high-technology industry, it's not like in the old days with a lorry-driver you needed muscles size of a brick to handle a lorry and these days you don't... there are more female sales people than we did have but its still not evenly balanced, particularly in sales management (CSwP)

Thus managers seemed to perceive that women were at neither the introvert techie nor the extrovert business person extreme of the continuum, they appear to be in a mid-area, a *"no-mans land."*

Being an extreme techie and performing extremely technical work is therefore perceived as a masculine role and one that is largely carried out by men. It does not seem to be a role that women are particularly interested in or want and is mostly not something that they chose to do. Thus the association of technical work and masculinity is alive and well and the corresponding aversion between femininity and technical work is upheld (Cockburn, 1991; Bailyn 1987) and used by managers when defining individual value.

Technical skills, as shown earlier, needed to be harnessed in order to be valuable, if left to run amok they might be detrimental to the organisation and waste scarce resources. Unlike technical skills, interpersonal skills were valuable in themselves, probably partly because they help people to get along with one another and fit to into the organisation (Lee, 1994; McLean et al 1991). However, they were of the most value when used in a business way. Interpersonal skills that just resulted in people being pleasant and personable were not therefore highly valued rather those interpersonal skills that were most valued were those that were directed towards helping the organisation to succeed. These were also the type of interpersonal skills that were more likely to be codified and rewarded (e.g. the negotiation skills of consultants).

4.2.5 The Value of Hybrids – Who they are and What they do

The value placed on the hybrid person who can combine technical with business and interpersonal skills has been widely emphasised (e.g. Pemberton and Herriot 1993, Keen, 1988) particularly in the writings of Michael Earl, David Skryme and Colin Palmer who argue for the need for hybrid managers within I.T. All the managers in this study wanted their staff to be more than just technical experts and to combine their technical skills with interpersonal and organisational skills. Ultimately, managers wanted hybrids who could also combine business understanding with technical skills. Such hybrids provided a necessary connection between people, the organisation and technology and more widely between the business and technology (See section 2.4.7). The fact that business orientated people and technology oriented people were somewhat at opposite poles made this linking role particularly crucial. Also the fact that hybrid could combine these contrasting skills, which for most people were incompatible, made them seemingly rare and thus particularly valuable.

> One of the most important skills these days is to be able to relate to the business, being able to relate I.T. matters in a non-technological sense to the business and translate what business needs are into I.T. speak. That is the area that we find it most difficult to fill because those talents and skills are quite rare. There is no problem getting technical people. (DPh)
>
> I think that it is business awareness / applied skills, somebody who sees technology purely as things technical is going to get lost they've got to be able to relate that to the business. They've got to be able to say what is really important here, what does the business need, how much is going to cost, is what I'm doing of benefit (DEng)
>
> If the individual goes down a technical route in their career they get more and more deeply technical - traditionally and typically they are not the type of people who would be good communicators. Not extrovert, quite introverted – that's a vast generalisation but as a common denominator. Whereas business and sales people are definitely extroverts – they're talkers. And we're looking for someone in the middle whose got technical skills and the business skills as well and everybody's looking for them because you can't sell software without them - the sales person can open doors and find opportunities but the sales person can't explain the technology they don't have the background. A technician would die rather then stand up in front of an audience of people and present the technology. (CSwP)

The category of business skills could also be called managerial skills. It involved general organisational awareness about how the organisation worked, the ability to deal with organisational politics and the ability to interact with others to get things done. It also included wider knowledge of the organisation's business, its environment and its industry or market sector. The implication was that people with such knowledge could help the organisation use technology to achieve its goals.

At one extreme was the I.T. guru – a relatively technical hybrid – recognised by many managers. An I.T. guru or technical architect was someone who had in depth but also wide ranging technical skills – they seemed to manage to be both narrow and broad. This strong technical background was combined with the ability to take a high

level view and provide organisation wide technical solutions or plans for where the organisation should go technically in the future. Most companies and departments seemed to have a relatively limited number of roles for such people, however they were valued.

Most company managers wanted their staff to have more than just knowledge of their individual organisations. In addition, they emphasised wider business or industry knowledge. One manager spoke of the business skills that project managers in his company required. He explained that they needed to know about the client's business as well as their company's particular area of expertise, which in this case was managing the implementation of large, complex, I.T. solutions

> They actually have to know about the business of the client because if they don't they wont understand what success means for this project and that is crucial. Neither would they understand the constraints that the customer is working under or why the customer wants you to do it this way instead of that. So knowledge of the customers business is very important, however, it is also true that you need to understand what is possible and what is not and the challenges that your technical people face otherwise you will find it very difficult to manage them and motivate them. So particularly with these large complex projects we do need I.T. managers who have a grip on what it means to build an I.T. solution, which bits are going to be tricky. (C)

Another manager of a company, which sold engineering software, stressed the importance of her staff having an engineering qualification and a number of years experience working within similar environments to that of their customers.

> So our people have to be able to understand technically in depth the product, marry that to an understanding of the industry - a good strong manufacturing, engineering background to understand what the customer's problem is. (CEng)

She explained that people with such a background could communicate effectively with customers. Here again interpersonal skills are being used in a business-type way and are valued. Also people are being talked about in terms of having technical depth but also wider business /industry knowledge and experience. Likewise, a manager who worked for the automotive and industrial products part of a consulting company wanted his staff to have experience of that industry.

> I would be looking for people particularly with line management positions in automotive and industrial equipment so they have managed businesses or parts of businesses in the large car makers. (CC)

The company's expectations were governed by meeting their client's expectations. Knowledge of the client's industry and the problems that they faced gave the company's staff credibility and helped the company sell their services.

Not all company managers were so demanding (CFi; CO). People might join the company knowing little about its business or that of its customers. However,

managers mostly expected them to learn. Those people who understood more about the company and its environment were largely also more valued. It was often only the more junior roles and/or those in extremely technical roles who were not expected to have such knowledge. Other roles at different levels (e.g. consultants, project managers, pre-sales staff, management) required people to liaise with customers and explain, advise or demonstrate to them how the company's products or services could benefit the customers' businesses.

Departmental managers did not place great emphasis on their staff understanding the host organisation's business, only company managers seemed to actively recruit for or develop specific industry knowledge in their staff. Although departmental managers wanted a general business or organisational awareness in their staff, they very much remained the techie experts; any specific business or industry knowledge was a bonus. Departmental managers appeared to settle for their staff having a general understanding of how I.T. might be used by organisations and a willingness to help the organisation and users to do so. It appeared that the management of I.T. departments themselves largely acted as both links and buffers between the department and the rest of the organisation.

> When you get down to the people that actually provide support then it *(having a technical focus)* doesn't matter so much as long as technical services manager is business oriented, so it is up to the manager, it's the manager's role and its up to me to see that we don't go off track. (DHC)

As one user manager explained, he tended to deal with the department's management rather than those lower down in the department.

> In I.T. I only deal with the more senior positions ... the I.T. manager – he's responsible for I.T. for Healthcare for Europe – so fairly senior management level. And then I'm used to dealing with the development managers rather than the analyst programmers – well both but more the development managers. (DPhU)

Departmental staff therefore might be rather cut off from the rest of the organisation and the organisation's business. Within I.T. departments, managers were often the "I.T. people" who understood and were required to understand most about the host organisation's area of business. Other staff largely seemed to concentrate on being I.T. experts rather than being experts on the use of I.T. within a particular area or industry. This helped to make I.T. departments quite separate from the rest of the organisation with their staff forming a distinct subgroup. Given that they were a department within a larger organisation that may not be surprising, however, company managers, although responsible for specific parts of the company, nevertheless seemed to talk about the company as a whole.

In some ways, the valuable hybrid that managers described was epitomised by themselves and others in management positions. I.T. managers appeared to combine relatively high levels of technical, interpersonal and business skills. However, being a manager could mean the person losing their specific technical skills, (although presumably not their technical aptitude). Thus although managers might seem from both their position within their organisations and from their discussions of valued skills to be a valued group, they were also a group that could be considered to have switched occupational area. As one manager pointed out he was no longer an I.T. person but a business person.

> I've been an I.T. professional, about 30 years. I've done most things during that time. Now I don't see myself as an I.T. professional but as a business professional - my job is worrying about business issues not technical issues (DEng).

Indeed many of the managers that I interviewed no longer seemed to see themselves as I.T. people. Also some I.T. company managers pointed out that the higher levels of management within their companies did not necessarily need a technical background, rather a business background might be more appropriate. Similarly, research has found that I.T. managers are being encouraged to be business people rather than technologists (Grindley, 1995; Applegate & Elam 1992; Couger 1988). So although managers might appear to be valued I.T. people, in fact their categorisation as I.T. people in itself is questionable. Some managers, such as line managers, project managers or functional managers who combined a technical job with management responsibilities are therefore possibly closer to the valued hybrids that managers described. In addition, other non-management roles, such as pre-sales and other consultancy type positions were also hybrid–type roles.

In addition to the specific skills just discussed managers also mentioned other abilities that they valued in their staff. I have divided these into three groups: Doing and Achieving, Flexibility and Adaptability and Stability and Commitment. These three groupings of abilities are all interlinked. Significantly for this research the way managers constructed these abilities also reflects the business and organisational focus and preference of managers outlined above and further illustrates the differences between I.T. companies and departments.

4.2.6 Doing and Achieving

The division of labour between the more routine, technical job of programming and the more intellectual and abstract role of systems analyst has been noted (Kraft, 1979; Vitalari, 1985; Brooke, 1995). As has the distinction in the I.T. occupation between concrete, technical as opposed to more abstract, organisational and people

orientated skills, with greater status being given to the later (Domm et al. 1990). In this sense, the literature suggests that managers are likely to place increasing value on the more abstract business skills, rather than on the more practical technical skills.

However, many managers mentioned valuing people with practical as opposed to theoretical skills. Departmental managers in particular emphasised the value of "doers," people who actually got things done. One departmental manager explained that this could mean someone who perseveres with a problem until they find a solution, alternatively it could be someone who recognises the time and resource constraints and produces the best result given these limitations.

> I want people who are very good technicians and if they have got a problem will keep at it and at it, with absolute doggedness and determination but again I don't want them all like that. Sometimes the right thing to do is to do a cheap and cheerful, not a bad job but adequate, that gets it done. (DPub)

At times it might be that there is no solution and a person who recognised this and moved on was valued.

> a successful project is the best that you can get out of it ..... and if failure is the best that you can get out of it then that's fine. (DHE)

The important thing for departmental managers was that the person could assess the situation and decide accordingly. They could not afford to have people who wasted time. People needed to produce a result as quickly as possible and then get on with the next task.

One departmental manager explained that he wanted people who completely finished a job. He remarked that women were particularly good at this whereas men tended to get bored once they had could see the solution.

> Caroline who has just left could do that role *(business analyst)* better than a male counterpart but basically because she is methodical. She goes through a set of procedures. She is intelligent as well. I've found that in myself if I can see the end of the solution then I am not very good at finishing. I can start and I can motivate people to start and then I get bored and I don't finish. .... but to me the people that really organise and finish the job they are superb and I mean finish not just dabble. Where is the documentation - it is not important to a fella. The job is not finished. So it is all part of quality of delivery. When we have had some good - those people have been mostly systems analyst and programming - females. I stand on that - they finish the job, its neat, it is nicely presented it is finished. (DTel)

"Neatness" and "nice presentation" are curiously feminine sounding qualities to apply to technical work and possibly not ones that would be so readily applied to a male employee's work even if it were finished off. Also, interestingly, although this "thoroughness" might potentially make women better business analysts or even departmental managers than men, in fact they were used here in the seemingly lower and less valued roles of system analyst and programmer.

Another departmental manager also explained that he valued people who were both "self-starters" and who also had the ability to finish. This was in contrast to people who were thinkers and idealists.

> Self-starting ability, confidence, decision making – you can't have a situation in a team where we have too many people in a team waiting to be told to do something. People need to be able to look about and for the appropriate level at which they are decide what needs to be done. Also finishing ability is also important as well. A team needs some thinkers but if all they do is sit and think well that's ok but we can't have too many people who sit designing the perfect solution and not delivering. People who actually do. People who are reasonable pragmatic, who get something up and running and do the polishing later. (DEng)
>
> One guy's an idealist and we haven't got the resources and don't live in an ideal world. (DHC)

Departmental managers did not need people who were too idealistic and who were aiming to arrive at the perfect solution. They wanted people who were pragmatic. Again, the lack of resources within departments meant that staff needed to be able to recognise and accept the constraints and to be able to achieve the best solution possible within the constraints that they were working under. According to one manager they also needed to recognize that aside from the resource constraints computer technology was not perfect and did not necessarily work as expected (DHE). Again, staff needed to be realists.

Thus through this focus on doing managers distinguished between theoretical knowledge and more practical and applied skills. They also differentiated between people who were idealistic and perfectionist and those who were more realistic and pragmatic. In each case, they valued and preferred the latter because such people produced results.

Departmental managers valued people who were proactive and self motivated and who would take responsibility for a particular area or piece of work. They did not want people who needed to be told what to do or whose work they needed to monitor.

> we want people to take responsibility. They will be given all the assistance that they ask for but the responsibility is theirs to a) produce the work and b) communicate otherwise - we're not going to be able to do this on schedule is there anyone else who can help. We don't want to employ people who are just going to sit there and the team leaders keep checking (DBa)

As one departmental manager explained, people who were self managing cost less and took up less management time.

> managing ones own time in a highly pressured environment is bloody difficult. And I value enormously people who can do that more effectively because they require less time from the more senior managers, clearly. Because again I don't really want to put too much effort into just staring over people's shoulders... If they are capable to manage their own time then they're a lot more useful to me, because they cost me less" (DHE)

Again his concern as a departmental manager was focused on resources, or more precisely resource limitations.

Being pragmatic, proactive and "doing" were also important for company managers. However, the data showed that whilst departmental managers simply wanted people who got things done, company managers wanted more, they wanted people who achieved. In contrast to the departmental managers, company managers expressed more sense of dynamism, drive, motivation and professional growth in connection with the "doing." There was not the sense of compromise or doing tasks sufficiently well that there was in the interviews with the departmental managers. Consequently they did not associate being proactive and doing with managing to accomplish tasks in spite of the lack of resources. Rather the emphasis was on these attributes in connection with achievement, challenge and getting ahead.

> the successful people are those that will take on a challenge even if they haven't got the skills to do the job. Very often people will take the responsibility for achieving something even if you can't do it yourself, maybe you borrow 30 minutes of 6 peoples time to achieve that result. You take the responsibility to make sure you've delivered it to the team. .....Everyone is hopefully trained and you've just got to get things done and we'll worry about the paperwork afterwards, let's just go ahead and achieve and get a result and its been very successful. (CSw)

Companies needed people who through their own efforts would help the company to achieve. Often managers were part of growing companies and they valued people who could grow with the company and take on different roles. This would be particularly important given the skills shortages that managers perceived within the I.T. industry.

> self-drive and motivation and the ability to use their own initiative. That is important here because we have a well-defined career structure which is flexible but we are fast growing and the group itself is very large, each profit centre is quite small, so it is important that everyone plays to their strengths and works with the rest of the team and sees opportunities and roles and seizes them - that's how you grow a career with a company like us. There are no dead men's shoes you get promoted on merit. (CFi)

Consequently, the difference in terms of doing very much reflected the difference in overall goal and ethos of I.T. companies as opposed to departments.

The company managers, in contrast to the departmental managers, lived in a much more achievement driven world in which they had to sell and remain competitive. They therefore wanted employees who were pushing themselves to be the best that they could. Departmental managers lived in a much more task-oriented world in which tasks needed to be completed and they therefore needed people who could help them do that.

Like interpersonal skills, "doing" was an ability that was valued in relation to managers' business and organisational concerns. As such business skills became

associated with pragmatism, proactivity and doing and in turn technical skills became associated with a theoretical and idealistic outlook.

> I think that it (what is valued) is business awareness / applied skills, somebody who sees technology purely as things technical is going to get lost they've got to be able to relate that to the business (DEng)
>
> What can we in I.T. do that will improve our business. A proactive sort of skill. (DPub)
>
> A pragmatic approach which we don't always find - that is one problem with computer scientists, they are not always practically orientated. A lot are trained in their science but don't understand the outside world and therefore application becomes very difficult (SCMd)
>
> empathy for the business and often I get frustrated because they (I.T. people) are theoretical and they expect us to have all the knowledge of what we want. Then criticise us, for saying that we didn't say we wanted that, 6 months later. So they need some knowledge of the business. (DPhU)

Consequently, in order to be proactive and make appropriate decisions people needed to be aware of their environment. They needed to know what the organisation was trying to achieve and the constraints that it faced.

It appears at first sight that practical and applied skills are being valued over those that are more theoretical and abstract, which would seem in many ways contrary to the normal hand-head division whereby those that think, plan and manage are more valued than those that do. However to class technical skills as abstract and theoretical compared to more business orientated skills requires a particular view of the world. Thus it is not the practicality or application of skills per se which is valuable but what they are used for and how they are applied. Thus it is those skills that are applied to meet the organisations goals that are valued. Again, the worry for managers was that techies might not apply themselves in this way. Through this definition business skills become both practical and applied and therefore valued whilst also remaining cognitive. In contrast, those with technical skills are constructed as abstract and theoretical in that they are cut off from the real world concerns of the organisation and business. Consequently, those with technical skills tend to be perceived as lacking realism and pragmatism.

4.2.7 Flexibility and Adaptability

Managers also valued people who were flexible and adaptable. They spoke of the ability to learn quickly and to be part of a rapidly changing world. This was vividly summed up by one manager's opinion that to be successful I.T. people needed to be "chameleon like" (CSw). The different ways in which managers spoke of flexibility can be divided into three areas: the ability to be able to adapt as technology changes, to be flexible in the ways that the company can make use of you, and to be able to tolerate uncertainty. These are discussed below.

Technical Adaptability

Firstly, given the fast pace of technological change that managers perceived within the I.T. industry, understandably they wanted people who could learn and adapt to new technologies. People might need to adapt because a technology was becoming obsolete or just because the organisation had decided to make a change. As one manager mentioned, indications of "being able to adapt with the technology" (DPh) were one of the things that he would look for when recruiting experienced I.T. people. For him this ability to learn and switch to new technologies was a sign of career progression. Another manager explained that people needed to be up to date technically in order to provide support to the company's customers.

> To provide support to our customers we also need someone with a knowledge of different operating systems and networking – a person needs to be keen to learn to find out new things to be constantly updating. (SCEd)

Thus I.T. people needed to be up to date enough to support their customers' or hosts' I.T. use. In addition, if those I.T. people were able to look ahead for new technologies that would be useful in the future, even better. Again, value was linked to serving customers

Up to date and appropriate I.T. use is often associated with organisational success (Dalgleish, 2000, Grindley, 1995) and the managers interviewed also seemed to perceive this to be the case, hence the technical adaptability of staff was linked with organisational success. In turn, technical adaptability basically seemed to require technical aptitude and technical interest, they were prerequisites for it.

Multi-skilled

Secondly, managers also wanted people who were flexible in terms of what they could do for the organisation and in the way the organisation could make use of them. Thus people who were multi-skilled were valued.

> From where I sit ..... success is someone who from where they were recruited has shown an aptitude to move into other areas, perhaps that they had not intended to in the first place. They become multi skilled. They become of more value to us..... So in terms of technical skill sets we are looking for a certain amount of multi-skill instead of one person to do one job. (DPub)

> It's important to develop *(technical)* skills among as many people as possible so that they all feel comfortable if they're put in a position that they are not working in normally. I'd like to feel that they could become productive pretty quick. (DHE)

For these two departmental managers, as well as keeping technically up to date, it was important that people had as broad a set of technical skills as possible. This meant that people could be responsible for different areas and if necessary provide cover for other people within the department. People who were less technically multi-skilled were "a less flexible resource" (DHE).

The ability of people to be multi-skilled could be particularly important for relatively small organisational units, like the I.T. departments and smaller I.T. companies. Smaller organisational units did not necessarily have the scope to have a different individual for each area of work. Technical people who were also customer friendly were a more flexible and useful resource than those that were not.

> I suppose flexibility is an underlying strength that comes through there. You do have to be flexible in small organisations. ..... in the technical team we have people who are very customer facing who we can send out on to a customer site and we know that they will do a good job. Whereas we have back-room technical people who you'd never put in front of a customer in a million years either they would confuse them or upset them (CFi)

One user manager commented that she valued I.T. staff who were flexible in the way that they supported her department and that this flexibility came from an understanding of the business issues (DBaU). Thus this combination of technical and customer facing skills or technical and business skills also made a person multi-skilled and flexible.

Tolerance of Uncertainty

In addition to people being able to adapt technologically and being multi-skilled, there was a third way that managers spoke about flexibility. They valued people who had the ability to thrive, or at least tolerate rapidly changing environments and who had the ability to live with uncertainty. I.T. company managers in particular prided themselves on their organisation's ability to be dynamic and reorganise itself quickly. This was seen by managers as necessary in order to remain competitive. Consequently, company managers needed people who could survive the demands for rapid change and could live with uncertainty.

For instance, two company managers (CSw, C) pointed out that their companies had the concept of virtual teams and that this could mean people working on different projects and with different people from one month to the next. Therefore, people needed to be able to settle quickly into their new team roles and become effective quickly.

One of the managers also explained how his company's biggest fear was that as it grew, the company would become inflexible with people putting "barriers around their jobs," instead of doing what needed to be done. Again, there is emphasis on getting things done. This manager recognised that some people might find the fast pace "unsettling" but explained that this was the nature of the company. He commented that:

> if they want the same job day-in day-out then they should join a bank. I don't hold that against people it just doesn't fit our company culture. (CSw)

As the recruitment company director working on behalf of the company explained:

> Everything has to happen yesterday - tell you to do something today, people do an enormous amount of work preparing and then the next day things have changed that's the way it works. We require flexibility. (CSwP)

Another manager mentioned that when recruiting someone she would be looking for people who were used to dealing with uncertainty and working on ill-defined projects or in ill-defined environments.

> If you saw someone who had being doing a safe, fixed, well-defined task/job then that doesn't tell me very much, they could be good they could be awful I don't know. If you could see that someone had been doing something where they didn't quite know what the job was, we don't know what the customer wants, we don't know when they need it by, we don't know what we are trying to do but we delivered it - that would be of more interest. I think that taking responsibility is quite key, be able to make your own job, not be task based (CEng)

She perceived that the company's environment was uncertain and fast changing. It was thus a potentially difficult and demanding place in which to work and one that required special and adaptable staff.

Managers valuing of flexibility and adaptability was very much tied to the environment that they perceived themselves to be in. Thus given the rate of technological change they needed people who could adapt and learn new technologies. They also needed people who were multi-skilled. For departmental managers the ability of people to be able to understand multiple technological areas was important. As we have seen before, for both departmental and company managers, multi-skilling in terms of combining technical skills with customer facing or business skills was valued.

For company managers though there was the need to go further. Company managers believed that their companies needed to be flexible in order to react quickly to market changes. They relied on their staff to help provide this flexibility by for instance switching work task or groups as and when necessary. By comparison, departments appeared to be relatively shielded from these market trends and were therefore more stable workplaces.

So again, there appears to be a difference between what is valued between departmental and company managers and again company managers seem to want more. The flexibility and adaptability that managers valued was related to doing. Their staff's flexibility helped ensure that they could get done what needed to be done and in the case of companies achieve the goals that they were aiming for.

4.2.8 Commitment and Stability

Contrastingly, although managers valued flexibility there were restrictions to the sort or amount of flexibility that they wanted. For instance, managers often expressed

suspicion about people who moved between organisations too frequently or who worked as contractors. Instead, some managers valued people who had shown stability by staying with the same organisation for some length of time. Others appeared to be looking for a deeper loyalty, commitment or personal identification with the organisation from people.

Stability

Departmental managers valued stability because it meant that people would stay with the department long enough to get to know the organisation's distinct configuration of computer systems. This could be particularly important given that the department might not necessarily have the most up to date systems and would need people who were willing to put some long-term effort into understanding the particular idiosyncrasies of their mixture of technologies. Consequently, people who had been with a department for some length of time also had historical knowledge of the department's systems, which could be useful.

> If I wanted to know about the system then I tended to go to people that had been there the longest. (DBa)
>
> we are looking for people who are prepared to make a commitment to get know our systems even though they are not the very latest offerings. We need people who are willing to make a commitment, who have a long-term view and are willing to help us get to where we want to go over a period of time (DEngP)
>
> "knowledge of the network.... how it is and how it got there . So if we experience some sort of problem then they say ah yes I remember..... You wouldn't be able to deliver that to a diagnosis without somebody being here for some length of time" (DPub).

This manager went on to explain that up to ten years experience within the department could be useful because the department still had old equipment that they used and which needed to be supported. This equipment although out of date was tied into some aspects of the overall system that they were running.

Sometimes within departments only one or two people understood certain aspects of a system. It would be particularly important for the department not to lose these people. In addition, staff stability meant that organisations did not have to enter into potentially costly recruitment exercises. Some departments paid people according to the amount of time that they had been with the organisation. This was not presented by those departmental managers as significant; rather it seemed almost accidental. However, from the point of view of encouraging people to stay or attracting people who were looking for an organisation to settle with, it could be useful.

One manager commented that in order to gain stability it might be that his department would prefer to employ older people, who were more likely to be settled in both location and job, than someone who was younger. He recognised that this was at

odds with the image of the typical sought after I.T. person. However, the manager's department was not the stereotypical high-tech I.T. work place where a typical sought after I.T. person might work.

> *(attributes that the department needed)* that are not actually youth, enthusiasm, exuberance and all of the innovative skills that you would expect - some of them are - we want people that are stable in location and stable in locality, stable in the job. It might even be that we want older people because of that. Now Lord forbid me to say that in an IS environment (DTel)

Likewise a second manager remarked that the sort of people who were interested in working within an I.T. department might not be the same sort of ambitious people who wanted to work within I.T. companies. Again, he presents an image of a less achievement orientated and more settled person.

> I think that they are people who probably didn't want to do anything else and are quite happy to make that their job and stay there. I know I.T. people in other fields and I know that they are ambitious and they are trying to climb to the top of various trees and establish reputations and they are different sorts of people than we have in computing services. (DHEU)

Similarly, another manager said that his company might prefer older people (mid 30s) who were not so up to date and dynamic, but who were likely to stay with the company for some time. He explained:

> so I think that we do find very good use for people from perhaps not fast track type backgrounds. People who have experienced redundancy or live locally and haven't got the big horizon that a lot of other people have.....If you look at the perception in I.T. these days those people are passé if you like. They are not what companies are generally looking for because the flexibility is less ..... We often target those sort of people. (DEngP)

The sort of people who were stable might therefore only be doers and not achievers. In addition, given that departments appeared to be relatively stable environments compared to I.T. companies they might attract people who wanted to work in less changeable and uncertain environments and who were less tolerant of uncertainty.

Commitment and Fitting In

Company managers, whilst also not liking job-hopping, did not place such value or emphasis on getting people merely to stay with their company.

> Some get to the stage of manager and realise that at that stage that they are not going to go much further and are encouraged in the longer term to think about leaving. So the firm is constantly interested in having people coming up through the organisation but not many of those are destined to become partners at the end of the day. So XXX will encourage them to move out. And at the end of the day it is seen as a positive thing for people to move out and move on and do other things. In YYY it is seen as an act of treachery and disloyalty if you leave. It is a bad thing. (CC)

The attitude of this manager and others seemed to be that people should remain with their companies, whilst they were contributing or whilst they were achieving. The manager just quoted appeared to view loyalty in terms of remaining with the company

as an old-fashioned and out of date notion, which was alien to a modern, dynamic company. Consequently rather than looking for stability instead company managers spoke more in terms of people fitting in with the company and becoming part of it. Company managers talked in terms of a much closer partnership between the company and individual than departmental managers.

One personnel manager for an I.T. company spoke about what her company looked for when recruiting people. They wanted people who were specifically interested in both them as a distinct company and as a company within a certain market area. They wanted people who would become "part" of the company.

> we look at why they want to join us and why they want to be part of the industry, how they see their experience within the industry and with us rather than someone who is looking for the next job.
>
> .... It tends to be that this person has thought about why they want to be here and it matches how we see ourselves developing and growing. It tends to be that sort of thing. If the person tends to be, job hops a lot through I.T., done a lot of contracting that sort of thing then we would ask the question well how can you be part of as a growing organisation, developing with that organisation. (CEngP)

Similarly, she spoke about the people who were successful within her company. They were those people who were committed and who strongly identified their success with that of the company.

> They are those people - passion is too strong a word - but those who have a commitment to making the organisation successful and they put that before their own success and because the organisation / team that they are working in is being successful then they are successful. So again it is this commitment (CEngP)

Other company managers also spoke about the importance of employing the "right" people, people who would fit in with their company's culture. Often the culture that managers spoke of was commercial, customer or sales focused and they seemed to feel that certain people might find being part of that culture problematic. For one manager "cultural fit" was the most important thing to look for, much more important than people having the right skills.

> Cultural fit - can they work for a US software vendor. Very, very important .....
>
> If there's a cultural mismatch and that's very important because we can forgive skills sets. (CSwP)

Another manager described what her company looked for when recruiting people for management level positions.

> We look for attitude, good company fit, see where their skills lie, what they want to do and really it's an informal sort of thing - do we like you, do we think that you fit into our culture (CO)

Again, it was all about fitting in. She explained more about the company culture and what fitting in entailed.

> We are so focused on the customer ..... – the company is commercially aware. You have to put the company first, what can the company get out of it, what value will it add to the company if I do this.....It's just much more focused, people are much more intense. (CO)

One way that people might show their commitment was by being willing to travel and be away from home or being willing to work long hours. Being unwilling or unable to give personal time was limiting for the company and could also be limiting in terms of the person's career. On the other hand fitting in with the company's demands could involve considerable disruption for people.

> If you are too rigid, it's limiting personally for your own career development and also from the organisational point of view what we can do with people. We can't all be chiefs and there are one or two Indians in the team where you know that they can't travel (CFi)
>
> *(When recruiting we look for)* people who are adaptable because we do tend to expect people to - next week we want you to be in Hull and if someone can't fulfil that or it clashes with their own personal circumstances it's not going to make for a good employee because there is always going to be a strain between their home life and their life at work. (CEngP)

Such demands might be especially problematic for women with family commitments particularly if they wanted to get higher up within the company. As one manager commented...

> going off on maternity leave every couple of years and then coming back and that tends to be quite difficult to sustain at quite senior levels because seniority is based to a certain extent on continuity. You are who you are because you have been pushing and pushing and if you take 6 months or a year out then by definition your not as up to date and can't push quite as hard as the next man. So you tend to find that mothers that are bringing up families are not quite as aggressive as pushing forward their careers and quite enjoy the flexibility that they have at slightly lower levels to take maternity leave every couple of years..... So you have to be pushing hard over a certain period of time and be willing to spend long hours at work and you don't have a lot of energy left for a second existence. (CC)

Another manager, who was female, also noted the lack of women in more senior positions within her company and suggested that this might be because "women were more sensible about getting a balance in life" (CP). They had this "second existence" that the previous manager spoke of.

Thus women might find problematic company cultures that demanded that they identify so strongly with the company, possibly putting it first before home and more personal concerns. This level of identification demanded along with other factors might indicate rather masculine company cultures. One manager described the overly masculine nature of her company's culture.

> I think that the behaviour and personality of our culture is very masculine and we could do with some feminine influences - there is male and female in men and women and there is a lot of masculine behaviour in our senior women because they feel that they have to behave like men to get on. Expressing feelings isn't common place - there is a time and a place - but there is not as much good communication and feedback to each other about things that are going wrong and how to put things right. In terms of mediation, when I was in a personnel generalists role, if there was a conflict of some kind it tended to be up to personnel to sort it out because the two men couldn't or wouldn't. Just even seeing a

> different perspective on things and fairly judgemental attitudes - we need people to be decisive and make judgements quickly and on the right basis and I value men, our masculine traits for that but there is a balance somewhere and it is not quite balanced (CP)

Another manager described the sort of person who would fit with his company's culture – someone who could do lots of travel, lots of work and probably be a bit tough in order to cope with the company's sales team who he described as "like Rottweilers - if they're not happy they'll take it out on the technicians straight away" (CSwP). The sales staff in this company were mostly men. The company had trouble recruiting women particularly into sales jobs. Again this company and particularly the sales division appears to have a more masculine culture and one which women might find difficulty fitting into.

The fact that companies required commitment was not necessarily a problem for women but the culture that they were to commit to, might be, as it was a seemingly masculine culture, built on masculine-type business values. Women might be more stable in the sense of not wanting to change work organisations so often due to other non-work commitments and possibly being less ambitious than men, in the conventional sense of wanting to climb to the top of career ladders.

Techies as a group again might not fare well on the stability or commitment criteria. They allegedly have more commitment to their occupation and work than they do to their organisation (Gouldner, 1957 & 1958; Couger, 1996). Likewise, according to the managers interviewed they have minimum interest in business and the organisation. Also computer techies also allegedly change organisations frequently (Dench, 1998), again a perception echoed by the managers interviewed. Techies might have an interest and commitment to their work but that was not quite what managers are asking for. Hybrids however were just the sort of people that managers thought would be committed.

Again compared to departmental managers, company managers appeared to demand more of their staff. Just as they expected their staff to achieve rather than just do, and just as they demanded greater flexibility, so too they expected staff to be personally committed to the company and to its goals. These three demands of achievement, flexibility and commitment complemented one another.

4.2.9 Summary & Conclusion

My data show how managers uphold the existing stereotypes that define technical workers as introverts who not only lack interpersonal skills but also lack organisational commitment and business acumen. I.T. professionals' technical skills are constructed by managers in opposition to business and interpersonal skills. In

turn, these definitions and beliefs about technical workers are used by managers to justify and construct definitions of the differential value of I.T. professionals. Business skills are highly valued, thus it follows from this contrasting relationship between the two skills sets that technical skills are devalued.

In the eyes of these managers, it seems that technical staff need to be managed and controlled in order to ensure that they are working towards organisational goals. They are devalued because they are perceived to have their own agenda and a narrow view that does not enable them to appreciate organisational and business criteria and values. This puts them at odds with management and the organisation. However, they also appear as a "necessary evil" whose value could be great if management could harness it. To harness their abilities, extreme techies might be partitioned off away from others in the organisation, sometimes even to the extent of outsourcing their work to other organisations. However, this might also create a self-fulfilling prophecy whereby technical staff did not appear to have the opportunity to integrate with others or acquire business values or organisational understanding. Extreme techies were particularly problematic, and might only have a limited number and variety of roles. Technical skills were valued, they were the least that was expected of a valuable I.T. person, but without the benefit of other skills they required management for that value to be realised.

Technical skills are also devalued by managers because the rate of change in the I.T. industry makes the value of specific technical skills transient. Also managers believed that people could be easily trained in certain levels of technical skills. To be of value people needed something more than the level of technical skills that could be obtained from training; they needed a deeper understanding that would come from experience and investigation of the technology. This deeper understanding was tied to technical aptitude that would give people enough interest in technology to attain and maintain deep technical skills. However, technical aptitude also meant techieness, which signals this potential lack of skills in other areas.

Managers valued the rather rare and unique person who could combine deep technical skills with business and organisational skills. This person was described as having a broader view, thus their interests and knowledge extended further than a narrow focus on just the technology and enabled them to look at how computer technology could be used by the organisation to further their business goals. Business and organisational skills in turn required certain interpersonal skills.

In addition to knowledge of their organisation's business, company managers also wanted staff to have knowledge and understanding of their clients' businesses. This enabled their staff to engage with clients about things important to the client and show the client how the company's products or services would benefit them. Consequently, this credibility ultimately helped the organisation sell its products or services. Conversely, departmental managers did not actively recruit people with or train people in knowledge of their host's business, rather they settled for a general awareness of applying I.T. to organisational needs and a willingness to work with and help users.

Sales people and business analysts were two groups mentioned by managers who epitomised those with business and organisational skills; many also had some technical skills. However, they appeared to be counted more as business people than computer people. The computer people who were hybrids had roles such as consultants, project managers and other managerial positions.

The interviewed managers also distinguished between "doers" who had practical skills and who were pragmatic and proactive and those who were theoretical, idealistic and perfectionist. Managers valued the former rather than the latter because these people got things done. However, company managers wanted their staff to do more than just "do"; they wanted them to achieve and to succeed. Again, differences emerged between the comments of company and departmental managers, which appeared to be related to the type of organisational environment.

Doing and achieving were in turn associated with organisational and business skills, for instance, a certain level of those skills was needed in order for someone to achieve and be proactive in the sense that managers described. Almost by definition, achievers and doers had certain levels of business skills. Conversely, technical people often needed to be managed in order to "do," they needed someone else i.e. the manager, to provide the business and organisational insights about what needed doing.

Overall, managers wanted their people to be flexible and adaptable. This flexibility and adaptability was related to doing; managers wanted people to be flexible and adaptable in what they could or were willing to do for the organisation. It meant that people needed to be able to learn quickly and keep up to date technically. For those in smaller organisational groups, thus computer departments generally tended to be affected, it also meant being multi-skilled. For computer company managers though there was again the need to go further - they wanted people who could tolerate

uncertainty in the form of rapidly changing work assignments and work-groups. Consequently, again there are some differences between the comments of the company and departmental managers. Company managers believed that their companies needed to be flexible and able to react quickly to market changes and therefore their staff also needed to be flexible. By comparison, departments appeared to be relatively shielded from these market trends and were therefore more stable environments. As said earlier a selling verses serving distinction arises between the two types of organisation.

When it came to commitment and stability, again company managers wanted more. They wanted staff who would fit into their company culture, who would become part of the company and strongly identify with it. These people would need to be able to fit into a customer and commercially focused organisations. Staff might show their commitment by being willing to work long hours or travelling and staying away from home. Thus, company managers wanted people to be willing to adapt themselves and their personal lives to fit with the demands of the company and consequently people had to be able to manage the potential and likely conflicts between their personal and work lives. Company managers' demands seemed to reach to a more personal and deeper level than the demands made by departmental managers of their staff. Departmental managers did not demand so much of their staff in terms of achievement, personal resilience to change or in terms of compromises with their personal lives. See Table 4-3 below for a summary of the difference in valued skills between I.T. company and I.T. department.

Table 4-3 – Differences in Valued Skills between I.T. Companies and Departments

	I.T. Company	**I.T. Department**
Technical Skills	Deep, some scope for extreme techies.	Deep but extreme techies could be a problem.
Business Skills	General also organisation and client specific	General (NOT host organisation specific)
Interpersonal Skills	Business centred	User centred
Doing & Achieving	Doing & Achieving	Doing
Flexibility	Technical Adaptability; Multi-skilling; Ability to cope with uncertainty and rapid change	Technical Adaptability; Multi-skilling.
Stability & commitment	Commitment and fitting in.	Stability.

In keeping with Hammond (1992) the managers interviewed perceived that women computer staff were more heavily represented in support, training and help desk roles and less likely to be found in extremely technical roles than men. Women computer professionals at first appeared potentially valuable members of staff in that they could seemingly readily combine technical skills with interpersonal skills and in addition were unlikely to be extreme techies with their attendant shortcomings. However, training and support roles were not associated with deep enough technical skills or business-like enough interpersonal skills for the incumbents to be considered by managers to be valuable. Importantly, it may be that the interpersonal skills of women were expected of them and considered natural, consequently their skills may not be perceived by managers to be particularly unique or hard to acquire and therefore were not valued. In addition, women were less likely to be associated with having valued business, organisational or managerial skills than men.

Managers' need for doers and achievers may not work as well for women as for men. On the one hand doing is associated with completing technical tasks on the other it is associated with determining and accomplishing work of organisational and business importance. Given that by comparison to men women were not perceived as so business and organisational focused or technically orientated, the association of "doing" with either technical or business concerns helps to discount women as doers. They may also not be considered so career-orientated and competitive, and therefore not so much "achievers". Women were good at finishing off the paper work but this appears a small accomplishment in comparison to what managers valued.

Women were also, according to managers' definitions, not as flexible as men. Women as already said, are not readily associated with technical aptitude and thus may therefore not be perceived able to easily adapt to new technologies. Also although women might be multi-skilled and combine interpersonal and technical skills as we have seen they appeared not to have appropriate levels or types of these skills. Although not mentioned by the managers in this study, women are allegedly tolerant of ill-defined and uncertain situations and may therefore gain credit here. Lastly, women are associated with having responsibilities outside work that may interfere with their commitment to work. They may not be perceived able to give the company the same undivided attention that men do, although they may be "stable."

By organising the world in such a way, women end up with skills that are ordinary. As can be seen from

Table 4-4 below women's skills often fall into an ill-defined area between those of technical and hybrid employees. Their technical skills can be easily trained and thus easily acquired by anyone. They do not necessarily have business or organisational skills, which in turn are associated with other valued attributes of doing, flexibility and commitment. Also their interpersonal skills are skills that are natural to their gender.

Also, within this scheme of things, those who had purely technical skills were devalued. They may be able to adapt to new technologies but overall were not considered particularly flexible. They lacked customer facing and business skills and thus had more limited organisational uses. Also their lack of awareness of the business and its environment would make them less responsive to organisational or industry changes. The more hybrid person with their diverse combination of skills was multi-skilled and flexible in the way that the organisation could make use of them and thus again was valued.

People with purely technical skills, as discussed previously, were perceived to have less attachment to organisations than others. They were presented as being concerned with the interest and challenge of their work and with having the right equipment to do that work rather than having an interest in their employing organisation and its business. Unlike the more hybrid person with organisational and business skills, people with more purely technical skills seemed less well integrated into their organisations. Therefore, they probably represented a more problematic group for managers who valued people with stability and commitment.

Good managers could be considered to be the highly valued hybrids that managers were describing. They had these deeper, more substantial unique and longer lasting skills that managers described as valued. They were hybrids who combined business, organisational, interpersonal and technical skills – although those technical skills might be getting rusty or out of date. Their skills were not perceived to be easily acquired, but came through innate abilities or after years of experience. However, managers of the level interviewed often now considered themselves to be more business people than I.T. people.

The table below (Table 4-4) summarises the valued skills of the three groups just discussed.

Table 4-4: Comparison of the valued skills of hybrids, techies and women

Hybrids	Techies	Women
Extrovert	Introvert	Extrovert & Introvert
Deep technical skills	Deep technical skills	Less deep technical skills.
Interpersonal skills	No	Good interpersonal skills but not the right sort.
Business & Organisational skills	No	Not known for their high levels of business and organisational skills
Broad view	Narrow view	Not particularly either.
Well integrated	Partitioned off	Neither well integrated nor partitioned off.
Long-term skills	Transient Skills	Not particularly either.
Gained from lengthy experience	Can be easily trained unless the technical skills are deep in which case they require technical aptitude.	Some useful "innate" qualities
Project managers, consultants, managers	Programmers, technicians,	Training, support, help desk.
Proactive doing & achieving	Managed doing	Thorough doers
Multi-skilled – technical and business	Ability to keep technically up to date.	Somewhat multi-skilled but not multi-skilled enough.
Tolerant of uncertainty	Intolerant of uncertainty	Tolerant of uncertainty (?)
Stable, committed & fit in	Not committed & possibly not stable	Not as committed as would like, possibly stable.

4.3 THE DEVELOPEMENT OF A VALUABLE I.T. PERSON

From my interviews with I.T. managers, I have identified an expected development path for a valued I.T. person. It is not that managers explicitly outlined this path, rather it was apparent from the interviews that the development of certain skills or attributes or the taking on of certain roles was thought to precede and succeed others. I have divided this development path into phases in order to describe it. As Cochran (1990) does with his work on people with a vocation, I am using the term phases rather than stages because each phase is not discrete - one phase merges and blends with the next. For instance, someone might both be "exploring" whilst "becoming a techie." However, managers expect to see a shift in focus over time from someone exploring to someone mastering particular technical areas.

Unlike more general theories of development the following is a description of how the managers in this study view the career development of, not even I.T. people in general, but valued I.T. people. As with Dalton (1977, 1989) et al's model of technical careers one phase does precede the next and movement from one phase to the next does imply progression and an increase in value. The phases have not been related to particular ages as interviewees often did not explicitly relate their comments to specific ages. However, unlike Dalton (1989) who reports that his career stages are not age related, the phases identified here include people at the beginning of their careers and those towards the end of their careers, and earlier phases were expected by managers to involve younger people than later phases.

These career phases are listed below (Figure 4-2) and elaborated more fully in the text that follows. Within each phase the development of the different valued skills and attributes already identified are discussed.

Figure 4-2: Phases to a Valued I.T. Career

1. Getting started - someone with potential
2. Exploring - finding your place
3. Being a techie - establishing an identity
4. Using your Experience
    a. Technical Guru
    b. Being a Hybrid
5. Management
    a. Lower level management
    b. Senior management

4.3.1 Getting Started on an I.T. Career - Someone with Potential

A "normal" or recognised way of people starting an I.T. career was as graduates who were usually young people at the beginning of their working lives.

The Value of Graduates

Graduates were a group who provided a large pool of reasonable and relatively cheap (compared to experienced I.T. people) potential recruits. Given the skills shortage within the industry (Bednar & Bissett, 2001) this pool of candidates was useful.

Graduates were assumed by managers to have certain valued qualities, for instance "self discipline," "self motivation," the "ability to work hard" and to "manage their own time" (DHC). They had "shown a determination" and had "managed to stick it out" (DPub). They were believed to have "some discipline in learning" (CSw) and were recruited because of their "energy and enthusiasm, their flexibility and willingness to learn" (CP).

> they are practised and experienced at learning. For some reason they are more mobile, more versatile and flexible because they are keen to learn and they are hungry for a job and learning and development. (CP)

Graduates were a group who appeared to have succeeded within the educational world because of these qualities and in turn it was assumed that these qualities would enable them to succeed within the world of work.

Hammond (1990) reports that only 30% of computer professionals in her survey had computer science degrees. Similarly, most managers in this study saw a degree as a sign of "intellectual ability" (CP, CC) or "a passport for something" (CP) and were less concerned about the subject area. It might even be that a degree in an area other

than computing made the graduate a more interesting person and therefore a more interesting recruit (CC). A couple of managers did prefer computer scientists (C, DHE).

Many managers however, echoing the views of Dijkstra (1989) and Parnas (1990), indicated doubts about the value of computer science as a subject area. It was seen as a new area and possibly one that was not so academic, rigorous or even technical. Following this logic some managers concluded that if they wanted a technical aptitude then they might be better off with a traditional science or maths qualification, which would provide a more solid foundation on which to build.

> They *(graduates)* have almost nothing - they have a pulse - we try and get them with some technical understanding and its quite shocking how people can do computer science degree courses at really good colleges and come out and know so little about computing. Most successful people have done physics or maths because they are quite analytical and also they will have had a C programming element in their degree or at some stage a mathematically based programming language. We've had some success with engineering students as well who've gone through in electronic engineering because of the sort of things that they are exposed to. Arguably the worst candidates have been computer science candidates ... I think that it is our fault because we assume that computer science is a technical degree and it's not really. It can be I.T. in business and systems focused. We look for potential. (CSwP)

Thus in this phase of a person's career, there seemed to be a focus on technical ability rather than business or interpersonal skills. Although possibly not considered academic, computer scientists as already mentioned (4.2.6), were not necessarily considered to be practical either.

As well as the generic qualities already mentioned, managers also liked graduates because they were "malleable" and "receptive" (C, CFi, CO). The organisations often wanted to teach people their ways, therefore they did not want people who were too fixed or who had too many preconceptions.

> graduates grow their careers hopefully with the business so if you bring people in at more senior levels then they tend to be set in their ways, less adaptable to change and adjusting to the ways an organisation works. Whereas graduates are still immature, they are receptive to new areas (CFi).

In this sense, their lack of experience counted in favour of graduates. They were unlikely to have views or ways of working that were incompatible with those of the organisation.

There was also a belief amongst managers that organisation needed "fresh blood" (DPub). Again, graduates' very lack of experience was useful. They brought "new ideas and enthusiasm to the business" (CFi). They were a "refreshing breeze" (DBa).

> You need a certain amount of youthful thinking and therefore a continual flow of graduates coming in at one end and old people retiring at the other ..... not turn into a company of old fogies. (C)
> Ideally an organisation likes to see people develop through it. They understand the organisation, they understand the culture, they understand what it is trying to achieve, they're known. Could take senior people on after a 2 hour session..... *(but)* It's a much

> safer bet and much more rewarding if you can actually develop your own types of people. (DHC)

This idea of a flow of people through the organisation was seen as natural. It provided the organisation with some security when it came to replacing people at more senior levels. Graduates were people who could be trained or "grown" (CC) in the organisation's business and culture, the organisation could already be sure of such people before promoting them to more senior levels.

Weaknesses of Graduates: "reality shock"

Managers also found fault with graduates. They were often considered almost useless to start with. They were making a transition from the academic world to the real world and lacked knowledge and experience of how to be in the real world and were therefore required to learn and change. This "reality shock" (Hughes, 1958) that manager associated with graduates making the transition into the world of work has been well documented (Schein 1978; Arnold 1985).

Graduates have been found to over rate their abilities compared to the ratings of their managers, particularly with regard to interpersonal skills (Arnold & Mackenzie Davey, 1992a). Similarly, many of the managers in this study spoke about the graduates lack of interpersonal skills, their arrogance and their over estimation of their abilities.

> I do think that some of the people that come from University think that they are going to come into this and within two years they are going to be getting 40 grand and a company car and in 3 years it might be 60, 80, 120 grand - if I make it in London in the City. I do think that that's a bit extreme, maybe you find that 1/1000 manages that. (DBa)
> Whilst they *(graduates)* understand computer systems they tend to be less good at talking to real people in a way that real people find acceptable. Traits that are not uncommon are a little bit of technical arrogance for instance. (DHE)

This apparent over estimation of their abilities might also lead to dissatisfaction with the company or their work and ultimately lead to them leaving the company.

4.3.2 Exploration: Entering the "real" world

At the beginning of their I.T. careers managers believed that people needed to explore the new world that they had moved into. New recruits to the industry did not know exactly what they wanted to do, they did not know what was available in terms of roles or organisations and they did not know what they were good at. "It is a question of finding out reasonably quickly what your areas of potential are and - working on them" (C) or as another manager put it, people should "see the shape of the building at least" before getting "locked in a room".

Managers presented people at the start of their careers as ambitious, eager to get started and make something of themselves. However, they lacked experience and

skills and so needed to acquire them. They appeared much more driven to achieve than older people.

> They *(graduates)* tend to get moved around a little bit more quickly because they're developing their skills ..... So they tend to get moved around more than the people who have been here a number of years and they will also get to a point when they have been here 3-4 years where the movement cycle is less. (DPh)

Although people might have a lot of potential they were expected to exercise that potential in technical roles or at least start to build up some technical skills. As Schein (1993) points out a seemingly technical/functional orientation is normal at the start of many careers. For the managers I interviewed it seemed that technical skills were the foundation upon which an I.T. career was built. In addition, people at the start of their I.T. careers were largely assumed to be young and young people were believed by managers to have more technical aptitude than older people.

However, young people at the start of their careers were thought to lack independence and to require more management than people further on in their careers. For instance, one manager described the difficulty of providing appropriate tasks for graduates who were somewhat arrogant:

> They become easily dissatisfied with menial tasks. They potentially have an over estimation of their capability - so 6 weeks into a job they know it all - well they can't they haven't got the depth that is required. So it is about finding something that is stimulating and challenging enough but also educating them so that they learn that some of the more mundane things have something to teach them. If you have someone who has done the job before then you can trust them and have to spend less time coaching when you delegate something to someone. You have to select appropriate projects and be more directive with a graduate. (CP)

Ideally, tasks needed to be both challenging and developmental for the graduate and useful for the organisation. This same manager also spoke of the difficulty of getting the right balance between "tunnelling people too narrowly too early on" and giving "them something to aim for" (CP). Other research has also found a tension at the start of people's careers between independence and dependence (Schein, 1978; Dalton et al, 1977). Graduates have also been found to be unhappy with the challenge of their work (Arnold & Mackenzie Davey, 1992b)

Developing Realistic Expectations

Part of the role of the exploration phase was to enable graduates to develop more realistic expectations and to learn about the "real" world.

Graduates' lack of specific skills, lack of independence and need for others' time meant that they could be a cost to the organisation particularly if they left after training or early on, which was something that graduates were apparently known for. According to some managers, graduates could be self-centred and selfish. They seemed to regard their companies as development and training grounds in much the

same way as University was. They were slow to take responsibility for their own development and recognise that something was required of them in return.

> Graduates are well known for finishing their two year program and flitting off somewhere else and costing you lots of money.....they are like whinging, whining - it's like me, me, me, what are they going to do for me? They don't add any value. They don't think about what they can do for the company, it's what the company can do for them. (CO)
> we seem to get really good graduates in, train them up and lose them after the training program ..... It is a transition for them it is not like University coming here. This is the real world and we need a job of work doing as well as developing them. It is a two way thing. It is not just come and learn and move on. We need a job of work doing..... A certain % of graduates expect too much. Once they have been on this program and had all this investment in them it is up to them to sort their careers out and some of them don't like that, they want to be spoon fed for longer. (CP)

Graduate recruits appeared to view their employing organisation as similar to their university. They expected it to provide them with developmental tasks, they did not expect to perform routine or non-educational tasks and might also expect clearer feedback on their performance than the organisation gave.

Career, training and development opportunities have been found to be of central importance to graduates when choosing a company (Arnold & McKensie Davey, 1994a). Consequently graduate training programs as well as training graduates and teaching them about the company, appeared to be a way of selling the companies to graduates. In addition, the programs might enable the companies to keep graduates at least until the end of the program. Also they might represent the companies' efforts at trying to confine and control the exploration phase of their graduate recruits to the methods and time span of the program.

Although the managers of these two programs (C; CO) felt let down by graduates leaving after their training, it was not necessarily a surprise that they did leave. Other research has found that graduates lack commitment to their employing organisation (Arnold & Mckenzie Davey, 1994b). Likewise, many I.T. managers expected and accepted that people might change employer relatively frequently during this phase. Managers understood that people wanted to gain experience and encounter new challenges and realised that one very visible and obvious way of doing this was to change organisations. As one manager said, changing companies might be regarded as a way of indicating that you were career-minded.

> There is a pressure on young people ....to demonstrate that they want a career.....Probably most people that they take on only stay with them 2-3 years because there is a feeling that to be valuable and to enable you to get another position, to move on within your career, you need experience of different companies. (CEngP)

This highlights a potential paradox whereby companies want able young people to stay with them, particularly after the company has invested in their development.

However, they also expect young people to be dynamic and gain a breadth of experience, which can be demonstrated by movement.

Similarly, others have found young people at the start of their careers need to learn what to do and how to do things; they need to identify their talents, their goals and their values (Dalton et al, 1977 Schein's, 1978). Varied occupational experiences and feedback from the environment have been found to be important for this (Schein, 1993; Dalton et al, 1989). Novice I.T. people maximise feedback during this phase by their frequent movements either between or within organisations.

In this phase people started to develop their business, interpersonal and particularly their technical skills. They might not be proactive doers or particularly pragmatic but they had started to be useful and might start to achieve. They lacked commitment either to specific roles or organisations. Ironically, the flexibility and lack of experience, which helped to make graduates attractive to organisations, also meant that they had the ability and incentive to change organisations.

4.3.3 Being a Techie: Establishing Yourself

Other research has noted the importance at the start of a person's career of people establishing themsleves, locating oneself within an area and within a peer group and gaining respect and acceptance from that peer group (Schein 1978; Dalton 1989). This is what happens in this third phase of an I.T. career. Having explored different organisations and technical roles people were expected to continue in technical roles and establish technical expertise within an area. Without this focus people might be too generalist, lack direction and not have a solid foundation on which to build and move ahead within their careers.

> we now regard it as very important for someone to know what they are. I recently had a CV from someone who said they were an experienced x, y, z and I didn't really believe that and even if it were true you don't know what you want to be .....they are quite generalist... They perhaps should have made the transition from A to B but have somehow got stuck in between and don't know which way they want to go. One of the reasons that that is important is that we have to have people who want to learn new things and want to improve the way that they do things, that is a continual process and I think that if you are uncertain about what your skill set is - where your home base is - it is probably very difficult to focus on that. (C)

Managers no longer expected people to change organisations as often as they may have done earlier on in their careers. Managers also did not expect people to change technical areas and were suspicious of people who built up skills in one area and then wanted to move to another, although movement between certain areas was fine.

> Certainly what would put me off would be someone who been into a job for 18 months and then moved to another for a year. Has a job here and there. That rings alarm bells. ..... But I don't like to see people who have moved around a lot. I don't like to see people who

> have jumped in skills a lot ... Obviously as one progresses you'll broaden but the jumping I don't like to see - try something, didn't get on with it too well so ... (DPub)
> if someone comes along as a trainee then we can send them on a COBOL course. If they come along as a mid-line analyst-programmer and they don't have any COBOL experience then I'd have to ask them why they want to come into this environment (DBa)

This "jumping" from one skill set to another showed a lack of focus and commitment. Managers wanted to be able to discern a sense of continuity in people's career moves. I.T. people now no longer required close supervision or direction, they were more independent and in control than they were at the start of their careers. They were expected to have explored and were now expected to be committed, if not to their organisation, then to their technical area and to the projects that they were working on.

> The good ones spent a lot of committed time and effort getting a solution right for the customer. They are really wedded to the product or the software solution or whatever - very committed and loyal. (CP)

Two well-documented and related problems with technical careers are the degree of specialisation and the risk of obsolescence (Raelin1984; Dalton et al, 1977, 1989). These were themes for managers in this study. They often used the label "specialist" to indicate that someone was too narrowly focused and thus might be inflexible and inadaptable to technological changes. However, whilst recognising the dangers of becoming too specialised, managers seemed to regard demonstration of significant technical expertise within an area as a prerequisite for later career success. However, as one manager (expanding on his "rooms and building" metaphor already quoted) commented it was not just that the individual might become too specialised, the organisation might confine them - "you can very easily get locked into a room. Your skills then are made so valuable that you never get out of the room" (DTel).

Having established an area of expertise it was likely that to keep up with changes in that area people would need to be continually learning. Remaining a techie for any length of time meant that you would be required to not only stay up to date within your area but probably change areas altogether. It might be that your area was in general decline or that your organisation had decided to move to a different technology. These were acceptable reasons for changing skills areas.

> Somebody who has come from a completely different area and is just plonked in to it, is so much at a loss and so that's a hard thing to do. And I've had to do it a few times in my career and frankly I'm quite glad now that I'm a manager and I don't have to do it anymore. Because it is very difficult to do and it's a big job and you have to read deep and you have to dig deep into the system. You have to bury yourself into it for sometime (DHE)

He concluded - "so people reinvent themselves or have themselves reinvented" (LU). As Roberts & Biddle (1994) suggest, technically orientated professionals are

perceived to be motivated by opportunities for professional growth and skill acquisition. It appears that they have to be.

As mentioned in the previous chapter (4.2.2), managers on the whole did not regard technical training very highly as a method of gaining technical expertise. Most managers appeared to believe in learning by doing and all managers favoured some form of work assignment as a mean of development. Similarly, Dalton et al (1977) talking about the careers of technical professionals conclude: "job assignment is the single most important variable in career development" (p41).

Managers also did not want people to become too technically blinkered. They wanted people who, as well as specialising technically, were also developing interpersonal and organisational skills. Therefore making progress as a techie involved developing into a "hybrid professional" (DEng).

4.3.4 Using your Experience: Hybrid or Guru

Managers identified a "crucial question" (SCMd) in I.T. people's careers: to either remain technically orientated or to move into management. Many managers also identified a third possibility whereby people would become analytical and business focused and become hybrids. For some people it seemed that this hybrid phase might lead into management, for others it might be a destination in itself. Thus the hybrid role could be regarded as part of the managerial career path.

Technical professionals or those with a technical/functional career anchor are reported not to be interested in management itself and only tolerate administrative and functional management roles as a way of continuing to pursue their areas of expertise (Raelin, 1985; Schein, 1978 & 1993). However, for a valuable I.T. person the opportunity to leave purely technical work behind and to take on more managerial roles was presented by managers as a step forward in a person's career and not as a compromise. Being a hybrid certainly meant that people had to integrate the roles of technical professional and organisational person and resolve any conflicts that this caused. The opportunity to continue in a more technical role as a guru might satisfy those who were more professionally/ technically oriented.

Whether a guru or hybrid this phase involved a broadening of people's roles. People were no longer expected to completely focus on their area of specialisation or developing competence but were expected to use their experience to provide a wider view and give direction; to take on more technically abstract and wider organisational or inter-organisational roles.

The Technical Route – Guru or plateau

Managers recognised the danger of promoting people into management just because it was the next rung on the career ladder rather than because they were suited to it. A person who continued in a technical role might aim to "become a guru in their field" (CSwP). A technical guru, consultant or architect was someone who continued to be technically expert but also had wider organisational authority, responsibility and contacts.

> You'd still be involved code and development stage but you would have so much responsibility away from coding and you would be a technical consultant to the pool of people who are writing it, so if you've got questions to ask that's the person to go and ask. (DBa)
> technical architect, there is a place in medium to large organisations for the I.T. guru who as well as doing some tinkering is beginning to have some vision and say this is what the future is going to look like (DEng)
> Architect is someone who has been a Technical Design Authority but is now working at a higher level defining information architectures for the customer. A super designer. (C)

It was not clear how realistic it was to remain a techie. For instance, one manager said that it was ok to remain a techie if you were "technical brilliant" (CP). Given the belief that younger people tended to have more technical aptitude there was a danger that older techies would find younger people overtaking them. Also older people might find it increasingly hard to keep up with rapidly changing technology. Their ability to do so, as one manager remarked, "wore out with age" (DHE). However, older techies could use their experience to guide younger people and improve the way things were done. A couple of managers commented on the fact that older "pure" techies were rare. Thus although people might take a technical route they were likely to be hybrid professionals combining organisational and technical skills. Also the number of roles for these more technical hybrids seemed to be limited.

Older techies who did not have the extensive technical expertise to become gurus and who did not have the abilities or opportunities to move down the managerial, hybrid path might end up "settling down" (DEngP) or becoming "plateaued" (DPh).

> At the other end of somebody's career past 30-35 then in I.T. terms you have plateaued really there is not room for everyone to be a project director so therefore you come off the leading edge of technology. You are less marketable and slowly your more happy with 9-5, settling down etc. (DEngP)
> so people do reach a plateau where by they have reached the level of their capabilities and recognised that. So motivating them to continue to do a good job and be proactive in what they are doing is quite difficult sometimes. (DPh)

Previous research had highlighted this seeming limit on the value of purely technical skills (Dalton & Thompson, 1971; Bailyn, 1977) and the difficulty of finding suitable roles for people with a technical/functional career anchor (Schein, 1993) as their career progresses. Dalton &Thompson found that design engineers got their highest performance ratings in their 30s; subsequently became less and less valued. They

conclude that engineering as a technical occupation is not a life long occupation (Dalton & Thompson, 1989). This view was seemingly echoed by the managers in this study. From this and previous research it seems important for people to move away from technical work if they are to continue to be valued. Although as Raelin (1985) points out it is possible those that are plateaued do have the advantage of being stable, i.e. they were unlikely to leave the organisation.

The Managerial Route - being a Hybrid

As a hybrid, the emphasis was no longer on the technology itself but on the combination of both deep business and technical understanding – "you start marrying your technical experience with the business side" (CSwP). In Gouldner's (1957, 1958) terms, people were integrating cosmopolitan and local orientations, combining as they did both professional and managerial concerns. In this phase as much, or more significance was attached to the business as to technical understanding.

As hybrids people might be, for instance, technical overseers, technical forepersons, consultants or project managers. They acted as translators between the business world and the I.T. world and in a sense had a foot in both camps.

> I think that a big stage is managing a project. I think that project management is a goal for a lot of I.T. people. To get your own project and the size of that will vary as you get more experience. I think that everyone's jobs consists of projects but in I.T. that is very marked. You have a project to deliver and it is agreed and there are terms of reference. To actually be involved in setting those and managing the whole resource and the client interface right through is a very important step (DEngP).

People in this career phase were expected to have the experience and skills to take on the responsibility for anticipating business needs and foreseeing the costs, length of time, difficulties and potential enhancements to the business of technical ventures. As hybrids people played a managerial role. They were involved in the managing of others, had some responsibility for others' work and had control over the work that previously they had just carried out. However, as Keen (1989) suggests hybrids may face the choice of either maintaining technical skills or developing business and organisational skills. He notes there is the danger that people lose their technical edge without becoming "real" business people. This is a major career dilemma of this phase.

4.3.5 Management

Unlike being a techie there was possibly much more scope for people to stay in the hybrid phase of their careers and remain productive and valuable. Indeed given the limited managerial positions, people might have little choice. However, managers did seem to perceive that a successful career and being a valuable person would involve

continual change and progress. One way forward for a hybrid would be to move into management.

The difficulty of making this distinction between the hybrid and management phases of an I.T. career is complicated by the fact that the managers interviewed often mentioned de-layering and the need for managers who did as well as managed. It seemed that while reaching the level of management was good, managers also had to be seen to be contributing something "tangible" to the organisation to justify their cost.

The exact distinction between who is a manager and who is a hybrid may be problematic but the decisive factor seemed to be that the management phase of an I.T. career involved completely leaving technical skills and roles behind and concentrating on organisational and/or business issues. Management required more difficult to define and more abstract skills than other phases.

> So the people who tend to be valuable are not so much the technicians but the good managers, who've got vision, who can develop strategic plans, deliver those plans and so on and in some cases you don't need the I.T. skills to do that. ..... Vision, being able to think into the future and decide how to get there, maybe in an innovative way. Someone who has clearly got good business awareness. Good financial awareness. Planning ability. Good staff motivation. (DEng)
> I'm a macro person, ideas and concepts way things link together does it link to the business (DHC)
> We (managers) don't need to play with systems so much but what we have to learn to do is to expose ourselves to external ideas much more than the rest of the staff – because it is a little bit possible that a technological organisation can get introverted. It is important for our managers to look outside and see what people are doing out there in the big wide world and whether they are doing better than we are. (DHE)

Management as part of a technical career – lower level management

As mentioned in the previous chapter, even the status of management as part of an I.T. career at all might be questioned: management was portrayed by many managers as a change of career. For many managers technical work seemed to be the defining criterion for an I.T. career and leaving technical work behind signalled a move to a different area: business. Management might be the next stage to an I.T. career but it required more than technical experience.

> I think developing the overview, developing the technological overview tends to happen almost automatically. That's called experience. Developing the ability to apply that knowledge as an effective manager does not happen automatically and techies do not always mutate automatically into managers – I think that that is something where personal development and training is necessary (DHE).

Although management within a technical area is sometimes portrayed as a reward for technical achievements (Roberts & Biddle, 1994) most managers interviewed did not see it that way. On the contrary, it was presented as a reward for demonstrating management ability earlier on in your career. However, as previous research has

noted (Roberts & Biddle, 1994, Dalton et al 1977, Raelin, 1984) a certain amount of technical expertise is assumed to be useful or even necessary to manage the work of technical employees. A technical background is thought to be needed so that the manager is able to monitor and direct the work of technical professionals; there is the possibility of a power imbalance if the manager is not technical. Also managers with a technical background are thought to be able to command the respect of technical professionals. Similarly, many managers interviewed in this study regarded a technical background as desirable for lower level management (departmental managers; line managers) and they used similar justifications.

> You've got to understand the concepts. You've got to understand how things can fit together. What's achievable. What's possible. Yes you do need a technical background and you need to understand what someone is on about and if someone is pulling the wool over your eyes. (DHC)
> We have to see the I.T. manager today as first and foremost a member of the management team of the company and as someone who brings like all other members of that team a particular set of skills and one of those skills would have to be (I would think) an understanding of what I.T. could do for this organisation. (C)

Also at this level managers were quite likely to be interfacing with other managers with technical backgrounds and a similar background helped to give them credibility. For others, management skills were first and foremost what people needed. A technical background would be a bonus. Lower level managers as well as hybrids acted as translators between the I.T. world and the business world.

> a person with those *(managerial)* skills can manage something completely alien to him providing he has that support, that he is accepted, respected as someone who can get the job done – can get the company and the people where they want to go. (SCMd)

> but that person in particular is really a translator between two worlds and those that do it successfully have really got to understand the business that your company is in – how is it aiming to succeed, what are the critical success factors and how can I.T. help but you have also got to know the ways in which it is practical and realistic for I.T. to help so I would see that as really being the link between the two worlds, personifying the link. (C)

Lower level managers might have a technical background but their detailed technical knowledge if not already rusty from the hybrid phase would now become more and more out of date. Leaving their technical skills behind might be difficult and frustrating for managers. Although for others it could be a relief not having to keep up with changes in technology.

Senior Management

At more senior management levels an I.T. background appeared to be less important although I.T. company managers often reported that the top people in their companies did have an I.T. background. One manager commented that the I.T. industry was known for its weak general management skills. His company had experienced difficulties because senior managers had worked their way up from

technical roots rather than coming from business and management backgrounds. Recent senior recruits had different backgrounds.

> Most managers here have an I.T. background, they are ex-techies and that is part of the problem, which is one of the reasons I'm doing an MBA because I'd realised that my weaknesses and that was that I hadn't really come from a business management background that way, I'd come from technically up to the top. There is a lot of senior management in the company that have done just that. I think that recruiting at the moment - our Sales director and Operations director have come from outside have taken a slightly different route which has brought a strength in.... But it is still an issue for us, you've hit quite a sensitive area for us as an organisation and across the group as a whole because we can see problems. (CFi)

In addition, a couple of departmental managers commented on the difficulty of moving from an I.T. department into higher levels of management within their organisations. The perception seemed to be that I.T. departmental management by itself was not sufficient experience for more senior management positions. Thus whilst technical skills were seen as useful and possibly necessary for less senior managers, this was not the case for senior managers. Indeed for senior management a purely I.T. background might not provide the experience required. Other research has noted a trend was to hire IS executives with both IS and business management experience (Applegate & Elam, 1992). One senior manager interviewed described his skills as very much business focused:

> I just throw my hands up and say that I am not technically competent I shouldn't be having this conversation with you I don't know what I'm talking about. I'm proud to hold my hand up and say that I am not technical. I am a business man and I know about business process and how businesses operate and I know a great deal about how I.T. can do to help businesses change and position themselves strategically and to help change business processes and reshape them, to allow businesses to do things that they could never do before or do them in ways that they could never do them before. That is what I do for a living and that I can talk about. (CC)

Recruiting the right people for management positions could be difficult because the exact duties and skills required could be difficult to define and the people applying for such jobs were likely to be very good at selling themselves. Managers felt that it was important to select senior people with proven skills. Recruiting from outside the organisation therefore might be particularly problematic. As already mentioned the ideal was to promote known people from within. Also anyone coming in from outside the organisation would have a lot to learn and would need to get up to speed very quickly.

> You can't afford to have people at that level sitting around learning how the organisation hangs together, what the main offerings are, what the main types of expertise that are needed to do this and that. You can't afford to bring people in on very high salaries who don't understand the client base, who don't understand the particular industry that they are going to be working in, who don't understand how the sort of offerings that we are bringing to the table because they make you look incompetent as well as anything else in front of clients. (CC)

Indeed most of the managers interviewed had been with their current organisation for a long time and had worked their way up within it. However in rapidly growing organisations, like many of the computer companies, it was not always possible to find enough "home grown resource" (CC).

Managers' descriptions of this phase of an I.T. career fitted with Schien's (1993) managerial career anchor, particularly their comments about senior management. For instance, people in this career phase had climbed the corporate ladder and potentially had large amounts of responsibility. They had developed expertise within their industry. They identified strongly with the organisation and linked organisational achievements with their own efforts. They measured themselves by their pay and expected to be highly paid.

4.3.6 Summary & Conclusion

Table 4-5 below describes and summarises each career phase and shows how valued skills and attributes develop through each phase.

Table 4-5: Career Phases of a Valuable I.T. Person

Phase	Focus	Description	Valued Skills
Getting started: someone with potential	Broad but unrealistic Self focus	Graduates - Possessing generic skills (e.g. ability to work hard; ability to learn; energy etc) & potential	Flexible & adaptable with possibly technical aptitude.
Exploring: entering the real world	Broad Self focus	Finding out what you are good at. Requires feedback from the environment. Frequent moves between roles and organisations. Difficult to manage.	Flexible & adaptable. Developing realistic expectations. Learning technical skills Learning to contribute, be useful and achieve.
Being a techie: establishing yourself	Narrow Work focus	Establish in depth technical skills within an area or areas. Dilemmas of how much to specialise and how to avoid obsolescence.	Technical depth. Useful. Technical doer. Proactive. Somewhat multi-skilled. Somewhat inflexible. Technically adaptable. Technical commitment.
Using your Experience	Broad Business focus	Become a technical guru or a hybrid (or plateau)	Deep technical skills combined with organisational and business knowledge and experience. Multi-skilled. Proactive doer. Achiever. Flexible. Adaptable. Organisational Commitment.
Management	Broad Business focus	Leaving technical skills behind. Change of career to a business career.	Extensive organisational and business knowledge and experience. Ill-defined, abstract skills. Proactive doer. Achiever. Flexible. Adaptable. Organisational Commitment.

The emphasis at the start of people's careers was on their potential. During the phase of graduate recruitment a couple of managers used the metaphor of buying in your seed corn; this along with the subsequent watering, weeding and deciding what to do with your ripened graduates was a process that other managers seemed to recognise.

Subsequently the focus shifted to people's technical aptitude and skills. However, people were also increasingly evaluated according to their interpersonal skills and ultimately their organisational understanding and their business skills. In Schein's

terms people appeared to change from having a technical/functional career anchor to a managerial anchor. However, Schein suggests that people have one main career anchor that influences their decisions throughout their career. It could be that those people who were most valued within I.T. start out with a managerial career anchor and recognised that the way to implement this was by being successful as a techie. Also those with a technical/functional anchor, although valued at the start of their careers are likely to become less valued over time. The I.T. profession may initially attract those with a technical career anchor but might ultimately want and reward those with a managerial career anchor. This would explain the rarity of the I.T. hybrid who appears to combine these two anchors and indicates a problem within the I.T. career world.

People were expected to start their careers with very little commitment or stability. At the start of their careers they were thought to be willing and able to move around within and between organisations. They were also probably likely to feel that this was necessary in order gain experience, to show progress and to show that they were serious about their careers. As their career progressed people were expected to show more and more stability. However, stability in the sense of any lack of movement or progress signalled a career plateau and might lead to a decrease in the person's value. As for commitment, at the start of their careers people were thought to be self-focused and show commitment to themselves. They were expected to become increasingly externally committed as their career progressed: first to their work and the projects that they were working on and progressively, more and more to their organisation. Their work also became more and more central to the organisation or workgroup and thus the commitment to their work became commitment to the organisation. There was an increasing emphasis on contributing to the organisation and identifying with it.

People at the start of their careers, because they were expected to be young, were also expected to be flexible and adaptable. However, as their career progressed they were required to demonstrate this adaptability by being able to adapt to new technologies. They might also demonstrate their flexibility by for instance the tasks that they could carry out for the organisation or by their willingness to travel or work outside "normal" office hours. In this way, flexibility might also be a way of demonstrating commitment to the organisation. The challenge for people seemed to be the ability to demonstrate flexibility and adaptability throughout their careers. However, people who had developed as hybrids were flexible in terms of the way the organisation could make use of them.

The movement implied through this model signals progress. Indeed dynamism, change and progress were themes for the managers in this study; continuous achievement was one of the features of a valued I.T. career. However, any changes in a person's career that could be presented as progress were good but changes for the sake of change were not. Progress was a movement from more concrete skills to more abstract skills (e.g. technical to business). There is a change in what is valued from more surface level skills to deeper, personal qualities. Consequently, there appears to a change in emphasis through the career from what the individual can actually do to who they are. Earlier on in their career I.T. professionals appear to be valued for what they in isolation can do, later in their careers they are evaluated more in relation to their environment – what they can do within it, how they can act within it, who they can be within it – what they personally can contribute to the company. They become increasingly connected to their environment and are valued for that connection.

5 DISCUSSION

5.1 INTRODUCTION

One of the most striking features of the data and analysis was the agreement between and similarity of the perceptions of the interviewed managers. From analysing the data, I felt that the managers did seem to describe a well-defined shared world in terms of their understandings of the computing occupation, its involvement in their respective organisations and perceptions of skill and value within the occupation. It was also notable that the comments of my managers reflected the "story" told by much of the literature, both research literature and the popular computing press. I was particularly surprised and interested when, after gathering and analysing my data, I read a 1998 I.T. skills report by Dench for the Institute of Employment Studies in Sussex that corresponds well with what my managers were saying about I.T. skills, education, skills shortages etc. Indeed, my managers echo several reports (Conner et al 1986, 1989; and Caine, Price and Sanderon 2001) over a period of 15 years. It seems curious that there has been a fairly consistent message reported about the I.T. occupation and I.T. skills over a relatively long period of time. This is particularly so given that this period is also presented as one of great organisational change within the world of work and when we are talking about an occupation that is portrayed as dynamic and fast changing. Below is a brief summary of these recurring messages.

The computing occupation is recognised both as an occupation and as an employment area where the boundaries change and are fuzzy and where work roles and jobs are diverse. This was acknowledged by many of my interviewees who felt the need to clarify that we were talking about a wide-ranging and heterogeneous occupation, but seemed to have no problem talking about it as a distinct occupation.

Obviously, over time the specific technical skills needed have changed and there is also in these reports some sense of moving forward and things getting better, for instance Caine et al (2001) note that the supply of I.T. skills is beginning to respond to demand. However, the overall message from these reports and my data is that there are I.T. skills shortages and that these are problematic for business. As well as specific technical skills, there is a lack of more generic skills such as business-related skills, interpersonal skills and team working; and particularly a lack of hybrid personnel who combine these skills.

There are suggestions, both in my data and in the literature, that education, particularly computing degree courses, is failing to produce both the quantity and quality of skilled people needed. In addition, both my managers and the literature recognise that greater use could be made of groups other than graduates, for example school leavers, older career changers and the unemployed, although there seems little actual impetus to move in this direction.

There is also recognition amongst my managers that they employ fewer female computer professionals and that far fewer women apply for vacancies than men. Although they do not regard this as hugely problematic, managers recognise and would ideally like to change this. In the literature, the lack of women within computing is also noted, but seen as more problematic and requiring redress. Similarly, there is some recognition amongst my managers that women tend to work in certain areas and are possibly in lower status roles. The literature also points out this horizontal and vertical gender segregation within computing.

There is the implication in the literature and in the reports mentioned above that skills shortages may be partly due to the image of the computing occupation and that possibly some effort needs to be made to improve this image and better inform people about what computing involves. Also there are suggestions that enticing people into computing and retaining them could be improved by better career pathways and professional development. This was somewhat echoed by my interviewees.

In conclusion, there was a lot of similarity and consensus between my interviewees' comments and these reports concerning the overall issues that reoccur within and around the computing occupation and skills within it. The issues mentioned above are elaborated more fully in the literature review and I do not want to repeat them in any detail here. However, as I said before what I find most interesting is that there is so much apparent agreement but also seemingly little movement in overcoming skills shortages, educational deficiencies, numbers of women employed etc...

Where there was less consensus, because it does not really seem to have been investigated in these reports, were differences between types of organisation. The reports mentioned above, and indeed much of the research into occupations and occupational employees, looks at those working in I.T. departments or "non-professional" organisations. My data suggest that computer companies and computer departments are quite different organisational contexts in which different

demands are made of people, and managers construct value differently within these two organisational contexts.

The following discussion picks up on some of the issues brought out in the analysis and mentioned above. It also aims to further integrate the topics covered in the analysis chapters (i.e. organisational context, the construction of valued skills and attributes and the development of a valued I.T. career) to give a fuller picture of the I.T occupation and individual value within it. Most importantly, it locates the occupation and individual value within a wider framework of theories of occupations, expertise, knowledge and careers.

Firstly, the discussion below looks at the individual value of women. The literature and the analysis highlighted women as a group who are potentially a good source of valued computer professionals, but are not recognised as such. The following section addresses why this might be so. Secondly, I compare the career path of a valued I.T. person, presented in the analysis, with career stage theories and discuss my findings in relation to the concept of a boundaryless career. Thirdly, I discuss the differences with regard to individual value between the two organisational contexts presented in the analysis: companies and departments. The discussion then moves on to look at what the analysis and discussion so far might say about what is happening within the computer occupation as a whole. It does this by using Abbott's (1988) theory of the system of professionals, Carter & Scarbrough's (2000a) concept of regimes of knowledge and the ideas of Gibbons et al (1994) about modes of knowledge production. I have chosen these three theoretical perspectives because of their fit with the data, and their capacity to explain and frame the analysed data within a wider context. In addition, these authors are leaders in the field of "expertise", and their comments overlap and converge to some extent and therefore help to provide a clearer picture of what is going on with skills within the computing occupation.

5.2 WOMEN AND THEIR VALUE WITHIN COMPUTING

In the analysis of the skills and attributes that were valued by managers (see section 4.2), women were shown to not be particularly valuable, in fact their skills tended to be ordinary in comparison with what managers appeared to want. Women were not associated with having "deep" technical skills or with technical aptitude. Neither were they associated with possessing business, organisational and managerial abilities. That is not to say that the managers in this study perceived all women to lack technical aptitude, organisational skills and ultimately individual value. Rather these

attributes were not as readily associated with women as they were with men. Table 4-4 (p182) showed that women's skills often fell into an area between those of technical and hybrid employees, that is, a no-mans land. Unlike hybrid professionals, who were valued because they could integrate different skills and attributes in the right way, women seemed to end up with skills that fell between one set of valued skills and another. Thus, they could not be valued as techies, business people or hybrids. By organising the world in such a way, managers failed to construct women's abilities coherently and consequently failed to recognise their value.

Likewise, the career phases outlined in section 4.3 appear less appropriate for women than men. As shown in the analysis and in the literature, technical work can be problematic for women (Cockburn, 1991; Bailyn, 1987). The emphasis on developing technical expertise at the start of an I.T. career, and the fact that this forms a foundation for the rest of the career, are therefore likely to be difficult for women. In particular "becoming a techie" meant getting very deeply involved with the technology. It seemed to be expected that people would become immersed in technical work and identify strongly with their area of technical expertise. People and organisational issues were of less importance, and were largely concerns for people further on in their careers. This emphasis on technology as something of interest in itself, and in relative isolation from other issues has also been found to be problematic for women. Research has shown that women have a strong need for relevance and are more interested in computers as tools (Rassmussen & Hapnes 1991; Kvande & Rassmussen, 1989). Women may therefore find it harder than men to see the importance and relevance of their work during this career phase and consequently may also fail to develop the depth of technical skills needed to further their careers.

The seeming emphasis on technical skills at the beginning of a career and increasing emphasis later in the career of interpersonal and business skills may be inappropriate for women. Women may start their careers with greater interpersonal skills and may be more interested in, and place more importance on working with others than men (Bailyn 1987). This is borne out by the managers in this study, and by other research (Hammond 1992), showing that certain I.T. roles (help desk advisers and I.T. trainers) particularly appeal to women. Women may therefore have a more hybrid orientation to start with than men and may therefore seek hybrid-type roles. However, the development path outlined does not encourage this. In addition, given that interpersonal skills are defined in opposition to technical skills, having such skills might help define women as less technically competent. Later in an I.T. career when people are expected to take on more hybrid-type roles, women may find that they

have not sufficiently demonstrated their technical expertise earlier in their career to take on these roles.

In a sense the I.T. career development path is typically male, emphasising independence before connection (Gilligan, 1993). It starts with people being very self-focused and encourages them to develop specialist skills independently of other concerns. It expects that people will become engrossed in technical work and identify very strongly with it. The start of a career is all about becoming an independent specialist. It is only after people have gained experience that they become more connected to others and to the organisation. Such a development path does not allow for, or may be problematic for people who expect to start off more broadly – for example, with a sense of connection and a wish to develop their technical, interpersonal and organisational skills simultaneously. This career path might act as an enabling and guiding device for men, but as an obstacle for women. Not only might technical work be defined by men (Bailyn, 1987), but so might technical careers.

However, as well as being inappropriate for women, this career path may be inappropriate for the development of the kind of person that I.T. managers in this study are indicating that they want. The seemingly significant emphasis on technical skills at the beginning of an I.T. career with the relative downplaying of other skills and a broader focus does not obviously lead to the development of a rounded I.T. hybrid.

5.3 THE DEVELOPMENT OF INDIVIDUAL VALUE: BOUNDED OR BOUNDARYLESS?

5.3.1 Comparison of This with Other Career Stage Theories

Although the career phases explored in the analysis may not have an exact one-to-one relationship with the stages in other career development theories, the overall developmental path does correspond quite closely with those of other theories (see Table 5-1). The career development of a valuable computer professional and the career issues raised in my study correspond particularly closely with the investigation by Dalton et al (1986) on value within a technical career. Dalton et al found that engineers start out by learning to contribute, then develop technical competence and become independent contributors. As independent contributors they need to specialise and also keep up-to-date, but face the danger of obsolescence. If people are to continue to be valued they need to enter his the third stage of mentor and

move away from purely technical work and have broader interests and responsibilities which are likely to include directing others. Finally, they might develop even broader roles and become managers.

The notable differences in Table 5-1 between the career phases described here and others are Raelin's entrenchment (1985) and Super's disengagement stages (1988). However, both Raelin and Super were describing career stages more generally rather than that of a valued person specifically. Raelin's "entrenchment" stage does correspond with the "plateauing" and "settling down" that some managers in this study mentioned when people failed to develop into a hybrid or a guru in the "using your experience" phase. Nothing like Super's disengagement phase was mentioned by managers in this study. Given that managers were talking about valued people and largely younger people this is to be expected.

Table 5-1: Comparison of Different Career "Stage" Theories

This Thesis	Dalton et al. (1971, 1977 & 1989)	Raelin (1985)	Super's (1988) adult career concerns
Getting started: someone with potential	N/A	N/A	**Exploration** Developing ideas about an area of work; choosing an occupation and entering an occupation.
Exploring: entering the real world	**Apprentice**: developing an identity	**Finding a niche** i.e. somewhere to fit in.	
Being a techie: establishing yourself	**Contributor**: becoming an independent and technically competent professional	**Digging in** People are at the peak of their skills and committed to their work	**Establishment** Consolidating one's position and making a permanent place within an occupation. Demonstrating one's value.
Using your experience: Hybrid or Guru	**Mentor**: broadening of one's interests and abilities. Directing others. Acting as consultant or mentor.	**Entrenchment** Lowered aspirations and professional commitment.	**Maintenance** Holding on to one's place; keeping up-to-date; innovating.
Management	**Sponsor**: using judgement and skill to enable the organisation to interpret and respond to the environment		
			Disengagement Reducing load and pace of work. Retirement.

More significantly, Dalton seemed to focus on engineers developing their careers within a single company, whereas this analysis suggests that valued I.T. professionals develop their career within a wider, inter-organisational environment,

which includes the wider I.T. and business world. These differences are undoubtedly partly due to the timing of the two pieces of research – Dalton's work being carried out in the 1970s and this data being collected in the late 90s. Consequently, my findings reflect recent research and managerial rhetoric about boundaryless and self-managed careers (e.g. Arthur & Rousseau, 1996) and changes to the employment context.

Likewise, whereas Dalton identifies organisational mentors who guide young apprentices to an understanding of their predefined role within the organisation, my managers talk in terms of less well-defined roles for people and the need for them to explore and find a place for themselves. Conversly, Dalton does not talk in terms of exploration, the I.T. managers in this study appear to perceive a wider and more changeable world with many types of organisations, areas of work and possibilities and opportunities that need to be explored. The importance that Dalton gives to mentoring and developing others was not apparent in my interviews. The managers interviewed largely seemed to hold the view that given an environment that provided opportunities, people should/would develop themselves. It was up to individuals to manage their careers.

The analysis of the career development of a valuable I.T. person also highlights other issues raised by previous professional/technical careers research. For example, the transition of graduates from university to work; the problems of specialisation; the difficulties of keeping technically up-to- date; the opportunity to leave technical work behind and move into management and the potential problems of not being able to make that move.

5.3.2 Individual Value and Boundaryless Careers

Managers did seem to be in considerable agreement about the development path outlined in the analysis. Although this is not the only way a person might develop, it is certainly a recognised way. The path, as discussed above, fits well with traditional career stage theories and indeed with traditional notions of career (Kanter, 1993). However, there appeared to be something of a tension in managers' comments about careers. Whilst talking about the relative flatness of their organisations, the appropriateness of lateral career moves and the lack of opportunities to move into management, managers also portrayed a fairly standard hierarchical career path with management as the ultimate goal. They also recruited graduates and hoped to see some of them come up through the organisation and become managers; again a fairly traditional view. For departmental managers in particular this was anomalous as

there seemed very little chance of following this career path within their organisations. Seen within a wider inter-organisational context there was some scope for more hierarchical-type career movement.

In other ways the model of a valued I.T. career incorporates features of a boundaryless career. It is not assumed that progress will be within a single organisation. It is occupational. It is orientated towards progress. It is about learning, fitting into different organisation's and adding value. The individual is largely assumed to have responsibility for their career, and the market appears to play a significant role in determining individual value. (See section 2.5.2). However, the career outlined is not obviously individualistic in the way a boundaryless career is said to be (Ellig & Thatchenkery, 1996). Although there may be a variety of ways in which a person can enact each career phase; there may also be some flexibility about the degree to which they are required to enact each phase; or the extent to which one career phase overlaps with another.

As described by managers, a valued I.T. career therefore incorporates aspects of both the traditional and boundaryless career. Overall, managers' comments reflected the belief in the virtue of continuous movement, achievement and progress, whether that was lateral or hierarchical. It was about fitting into managers' conceptions of progress - it was this that women possibly failed to do (see above). To present a career in the form outlined was therefore a ready way to signal career achievement and value. The responsibility of career actors was both to themselves and to their employing organisation. There was some acknowledgement by managers of the value of inter-organisational learning and knowledge acquisition (see section 2.3.5). Certainly for some managers, connection to the "environment" was important. Careers in this model though are not repositories of knowledge (Bird, 1994), which seems too static a term; rather they are about gaining experience and making progress.

I believe that this combining of traditional and boundaryless careers reflects tensions between old and new organisational types and managerialist vs. more traditionalist views. The valued skills and their development are not organisation specific. However, to learn these skills, people are dependent on the organisation and rely on being able to hold certain developmental roles within their organisation. Different organisations and different organisational types are therefore likely to offer different possibilities for a valued I.T. career. This is discussed below.

5.4 ORGANISATIONAL ENVIRONMENTS & INDIVIDUAL VALUE

The company managers I interviewed talked of their companies as these "new" organisations (Mabey et al. 1998). These contrast with bureaucratic-type organisations in which people have very defined jobs, specified tasks and fixed responsibilities. Such organisations are associated with being slow to change and generally with being "old-fashioned" and out of date. The company managers did not want their companies to be like this, or to be seen in that way. They wanted people who could cope with the real, dynamic, cut and thrust world of business markets rather than those who wanted to retreat into a more secure, stable, but artificially fixed world. They wanted people who could deal with and ultimately thrive in this new dynamic reality that they saw. Although to be safe and fixed are not necessarily criticisms, in this context where change, movement and dynamism are looked up to, they were. It was almost a "survival of the fittest" scenario in which those organisations and people that evolved in step with their environment would succeed and survive, and those that were stable would die out. In contrast, computer departments seemed relatively more like these old-fashioned bureaucratic-type "organisations," although they were under pressure to be more adaptive and "business-like."

Consequently, these differences in organisational ethos meant departmental and company managers had different views about what was valued (see Table 4-3). These different organisational environments may also be more suited to people at different career phases; or to put it another way, a particular career phase may be easier to implement in certain organisational environments.

5.4.1 I.T. Departments

The I.T. departments appeared to have less scope as far as people's overall career development was concerned than the medium or larger I.T. companies. They had relatively small numbers of employees and low turnover rates. Careers within them were also somewhat limited by the departments' position within a larger company whose main area of business was not I.T. and by the fact that their function was to provide a service to that company. Thus departments were driven by the needs of the host company rather than the happenings in the wider I.T. industry. Their career structures and payment and reward schemes were part of the host company's structure rather than being linked to the I.T. industry.

Early in a person's career these factors might not be especially important. An I.T. department could provide a person with the opportunity to learn about the real world.

In particular, this "real world" consisted of working with imperfect technologies and needing to compromise in order to provide services, with limited resources, to users who had competing and possibly conflicting demands. I.T. departments, although only employing a small number of people, were responsible for a relatively large range of services and different types of technologies. Departmental managers seemed to be open to staff, particularly those at the beginning of their careers, exploring these areas. Consequently, although departments might not have the very latest technologies, they could still provide experience of different technologies within a relatively concentrated physical location.

For someone "becoming a techie," departments provided a relatively wide range of technologies and technological roles given their size. They also appeared to encourage people to learn their technologies in depth. However, I.T. departments needed people who got the job done and the jobs that needed doing did not necessarily offer people scope to develop a great deal beyond their role. As a person's career progressed the possible lack of opportunity to work on the very latest technologies might start to be limiting. For company managers their organisations' commercial orientation was presented as central, therefore the lack of experience of working in such an environment might count against people should they want to move from a department to a company.

Compared to earlier career phase there seemed less opportunity to enact later career phases within I.T. departments. The majority of the roles within departments seemed to be technical, therefore anyone wanting to move into more hybrid or managerial roles might find working in a department limiting – this was exacerbated by the low turnover. In addition, there was little opportunity to move outside the department into the wider organisational environment.

I.T. departments, in comparison to I.T. companies, seemed less dynamic environments. There was the danger that anyone working within a department, particularly if they remained there for any length of time, might be regarded as less dynamic than those working within I.T. companies. Furthermore, some departmental managers explicitly mentioned wanting people who were less dynamic, who had left the mainstream of computing and wanted to settle down. Such people might have reached a point in their careers where they had achieved all that they could technically. They might also have tried more hybrid roles but now wanted to move into less demanding roles and have a quieter, more settled life. These people were those who appeared to plateau rather than become hybrids or gurus. Although maybe not obviously valuable, such people were needed within I.T. departments

because departments mostly could not sustain people who were very ambitious and could not afford the turnover that employing such people would inevitably mean. Anyone who stayed within departmental work for too long might automatically find themselves "settled."

5.4.2 The Medium and Large I.T. Companies

The two smaller companies, like the departments, offered limited career prospects, whereas the larger companies were more suitable environments for the overall career development of a valued computer person. The larger companies appeared to be the "normal" environment that this development path assumed. Unlike the departments or small companies, it seemed that a person could (although probably would not) spend their entire career within one of these companies and follow this career path. Indeed, two managers from larger companies (CO, C) spoke about careers in this way.

The companies' greater scope as career environments was at least partly due to the fact that they were larger and employed more people. Even the two medium consultancies (CFi, CEng) were relatively large compared to most of the departments – and they were growing. They would have been unlikely to offer such good career opportunities if they had, like the departments, been static or contracting. Indeed, most companies were growing and given the skills shortage within the industry this meant that there were many new opportunities, new roles and diverse experiences for people. The I.T. companies seemed more dynamic than departments. They therefore suited the enactment of a dynamic and changeable career. However, particularly with the larger companies, there was the danger that people could get lost; people might not be able to find the opportunities available.

These medium and large companies also appeared more connected to their wider environment than the I.T. departments. They needed people with an awareness of their market, their customers and their competitors in order to remain competitive and successful. In addition to their relatively large numbers of staff they also had relatively rapid movement of staff within and between companies. Thus staff within these companies were well-connected with a wider environment and had opportunities to exchange knowledge and information with fellow professionals (see section 2.3.5).

Their relative size and growth made the larger I.T. companies potentially interesting environments for people at the start of their careers to explore. The companies wanted people to achieve and encouraged them to find a place within the company

where they could contribute best. The companies offered those at the beginning of their careers the opportunity to gain experience of the real world. In contrast to the real world of departments, the real world of companies gave people experience of working within the world of business, of seeing how a company worked and how it made money. Company managers were keen to reward people's worth and contribution thus working in these companies, unlike I.T. departments, also gave people the opportunity to find out what they were worth within the I.T. world, what others were worth and what was rewarded.

Like departments, companies offered people the opportunity to develop in-depth knowledge of various technologies and for people to demonstrate their professional skills. People were encouraged to specialise whilst remaining flexible. There were also many opportunities to move into hybrid roles. Many company managers reported less hierarchical career structures and fewer management opportunities than in the past; however there were still more than in the departments.

The discussion that follows attempts to relate the analysis and discussion of skills, careers and organisational-types to the I.T. occupation more widely. It looks at what might be going on with the occupation that enables such a system of meaning to exist, or that creates such a system of meaning.

5.5 ABBOTT'S SYSTEM OF PROFESSIONALS

Is there a fight over occupational territory or jurisdiction between business and computing? In terms of Abbott's system of professions, a new jurisdictional area around computing appears to have developed. This new area revolves around applying and integrating computer systems to improve the way organisations function. Although this jurisdictional area has developed relatively quickly, it is not a sudden change: it has happened over the last 25 odd years. During this time, changes in the computing occupation can be interpreted as attempts to occupy this new jurisdiction. Computers and computer professionals have moved out of the backroom where the computers were placed when they performed more specialist number-crunching and automation functions, and become much more integrated into the organisation. This change of position has affected computer companies and departments, with members of both taking on roles much closer to users or clients; their products or services becoming much more central to their customers' or hosts business' and their work

becoming more like a partnership between themselves and management (see section 2.1.2).

Thus a new jurisdictional area seems to have emerged and the computing profession, as Abbott suggests professions do, appears to have tried to colonise it. In doing so, it does not seem to have completely shifted its jurisdiction leaving old jurisdictional areas behind. Rather it appears to have tried to extend itself to cover a wider occupational area encompassing both its original technical work (involving knowledge and use of the machine and programming of the machine) as well as additional areas. Of course the specifics of the technical work, such as the technologies used in and by the machine and the programming language used, have changed but that area of work still comes under the computing occupation's jurisdiction. The additional areas added move the occupation much closer to business and management and away from computing's roots in mathematics and its adopted role model of engineering. This can be seen in the way the naming of work roles have changed: there may still be computer operator type roles and many more programming jobs may exist but the positions of operator, junior and senior programmer seem much rarer, they have become software, systems, network, application and many other types of technician and engineer. However, the people whom the managers interviewed valued were those who were less concerned with the technology per se – i.e. various flavours of manager, analyst and consultant – and were classed as hybrids. Hybrids play this interfacing role between traditional areas of the occupation and business and management and as such colonise this new jurisdictional area (see section 2.4.7).

This seems a logical enough extension of the occupation, which follows the way computing technology has evolved and changes in its use. However, it can also be viewed as quite radical and non-intuitive shift for an occupation to attempt to incorporate under its remit what can be viewed as basically quite different jurisdictional areas. As we have seen in the literature reviewed the relationship between technical work and business or management is traditionally presented as problematic. Also in the analysis presented, managers construct the two areas (business and technology) in opposition to one another. No wonder then that people in the study who managers valued were those that were able to, in some way, unite these two poles.

What enables this almost paradoxical position to be reached? Firstly, the position's existence relies on the construction of technical work as something done by workers and obviously management as something done by managers. In turn, this comes down to the hand-head division of roles that is traditionally used to divide labour

within organisations. However, it is more than just a way that work is organised: this construction of computing and business as opposites is also related to the way academic disciplines and academic knowledge are structured. As has been mentioned, academically computing has its roots in mathematics and has close ties with engineering and technology. In contrast, business and management are linked with and embedded in the social sciences. These areas are at odds. One appears to value rationality, logic and hard facts, whilst the other (although sometimes seeming to have ambitions in those directions) seems fundamentally concerned with interpretation, questioning and hypothesising. One studies *man*-made systems the other studies *man himself*. One therefore is interested in artefact and the other with people and humanity. Hence we get the division between machine and people as objects of study and the distinction between those who study and work in these areas as machine or people orientated and often therefore their stereotyping as introverts or extroverts.

Of course, this distinction is not as clear-cut as presented above, and arguments can be made against such categorical placements, but it does appear to me as a fundamental division that people often use and that the managers in this study also use to help structure and make sense of the world.

Computing's attempt to unite these opposing positions is assisted by its own lack of definition (see section 2.2.4). As Abbott comments, the disorganisation of a profession and its lack of clear focus and established cognitive structure help a profession to take over new tasks. Although computing does seem to have a clear focus – computer technology – that technology has evolved to become information technology and management information systems. The focus of the occupation has remained the same but the object of its focus has changed. The complication comes in the way the object has changed. The machine has become integrated into the human organisation and integral to the people's work. It is not just a tool but also an enabling device, enabling tasks to be carried out that people could not carry out without it. Thus the computer itself has crossed, or at least changed, this boundary between machine and person and the computer occupation has tried to follow – or possibly more accurately the occupation has developed computing technology which has challenged this boundary. However, the occupation does not appear to be completely in control of its invention nor able to keep up with its use and perceived potential.

The computer occupation is therefore under pressure to harness the powers of the computer. This challenge requires those, or at least some of those within the

occupation, to be able to cross this divide between technology and business; worker and management; machine and person: to be hybrid. However the movement that the computer occupation has made to date is not enough to satisfy the market, hence the continual skill shortages and calls for greater, faster movement. The occupation therefore comes under a lot of criticism because it does not seem to be delivering and causes governmental concern because there seem to be insufficient people with the required skills to ensure the full economic potential of business is met.

Although the computer occupation, through its lack of definition and open recruitment of people from many disciplines, is flexible, it retains its ties with the machine and technology. To attempt to establish itself in such foreign terrain as that occupied by business and management is therefore a difficult task. One answer might be to sever its roots. However, these have given the occupation power and provide an anchor. The computer is what helps define or codify computing as an occupation, it provides social understanding about the work of the occupation (Tolbert, 1996). After all what would the computer occupation "be" without the computer? Possibly this is too dangerous and radical a step to take. After all, as Abbott points out, a large jurisdiction is the goal of professions; although he also points out if the jurisdiction is too diffuse, it can be unwieldy and may disintegrate.

Consequently computing appears to have made some inroads into occupying a new jurisdictional area that has opened up and in doing so can be seen to have developed hybrid professionals to inhabit that area. According to Abbott, other occupations may try to make claims on such new jurisdictions. In this case, business seems to be an opponent that is battling with computing for control. However, business and management may not be occupations, rather they appear areas that include other occupations. For instance, Goldsworthy (1996) names accountants as challenging computer professionals over this new jurisdiction. Management consultants and business analysts may also be competitors. We are then left with an ongoing territorial fight between the computing occupation and more business-orientated occupations. However, computing also seems to be trying to redefine itself, so that it too is a business profession. Computing consequently appears to be both in conflict and collaboration with the enemy.

Who is winning in this jurisdictional war? Well strangely enough, it depends on how you look at it. The computing occupation certainly seems to have grown in importance and possibly also in power over the past two decades. However, to do so it has had to change and take on business-type values that are in opposition to the values that it seemed to hold previously. Thus it could be argued that computing has

been forced to change and been brought in to line by business. Once managers fought to control the techie computer professionals who had their own esoteric agenda, which was predictably often incompatible with management's. Now they are beginning to kowtow to management, trying to help them with their agenda, to learn their language and to apparently assist them in taming computer technology and bending it to the organisation's and the business's needs. An alternative view though is that this is a strategic move by an occupation that would otherwise have been left with a very narrow, well circumscribed jurisdictional area that others had considerable power and control over.

To use Abbott's concept of workplace assimilation – where one group assimilates the practice and language of those that are relatively more qualified – hybrid computer personnel can be viewed as having "read the writing on the wall" and in part successfully assimilated the practice and language of those that are valued i.e. managers or those who can command the managerial discourse.

Of course, this way of talking invites a view of occupations almost as "beings" that can scheme, weigh up and make choices – this is used for clarity and vividness. However, Abbott's model as used here provides an interesting view of the computing occupation, the way it has changed, the pressures it is under to continue to change and why difficulties necessarily arise around this attempted movement. It is also shows how these changes can be viewed both as restrictive, in that the occupation and its members are being forced to change and fit in with a dominant managerial agenda, but also enabling in that they provide the occupation and its members with opportunities for a greater organisational power, a wider role and extended careers.

5.6 CARTER & SCARBROUGH'S REGIMES OF KNOWLEDGE

Another way of viewing the computer occupation's current position is as an on-going conflict, both within and external to the occupation, between two regimes of knowledge. A regime of knowledge represents the interplay between language, power, knowledge and practice (Carter & Scarbrough, 2000a; Clarke & Newman, 1997). A regime makes sense of the world in a certain way. It has an internal logic which constructs certain interpretations as common sense or obvious and enables the construction of certain skills as valued or devalued.

In the case of the computing occupation, the technical regime and the regime of managerialism can be viewed as competing for dominance. These two regimes align with the enthusiast and pragmatist attitudes to progress which Grindley (1995) identified within the computing occupation (see section 2.4.8). He considers that the mid-1980s saw the pragmatists (or managerialist regime) take control from the enthusiasts (or technical regime) within computing.

During the technical regime's dominance the techies held jurisdiction (Abbott 1988) over computing matters; they were deferred to. However the rising cost and perceived growth in importance of computing technology to organisations, increasingly drew the attention of management towards computing (section 2.1.2 talks of the backlash against computing that occurred in the mid-1980s). Thus a managerialist agenda of efficiency, cost-cutting, delayering, customer focus, team working and empowerment (See section 2.1.1) came to dominate computing. This offered an alternative logic for identifying who was valued - one that the managers in this study can be seen to be using. Under such a regime, contribution to organisational goals and the measuring and rewarding of that contribution become all important; the use that the organisation can make of the technology and staff becomes a focus; and customers and serving them take centre stage.

Within the managerialist regime technical skills became secondary to, and supportive of, business and managerial skills. As Carter & Scarbrough (2000a) point out the regime of managerialism problematises alternatives by establishing a binary opposition in which managerialism is represented as modern and the only way forward. In their case study company, they found that engineering skills were only remarkable by their absence. In my study, technical skills were not completely absent from managers' conceptions of required skills, but they were constructed as problematic. Technical skills were defined and evaluated according to the criteria and

agenda of the regime of managerialism and thus the techies were found wanting. The I.T. occupation can therefore be regarded as in a state of conflict. These two regimes of knowledge are fighting it out, with the managerialist regime in the dominant position.

Technology and technical concerns do not appear to be legitimating factors for I.T. work according to the managers in this study. Rather the focus is on user and organisational concerns and the effectiveness and value added by I.T. and these are the legitimating factors for I.T. staff from the managers' point of view. Carter & Scarbrough (2000b) suggest that the ability of management consultants to act as cultural intermediaries between management and the latest management fashions and knowledge is an important source of legitimacy for them. Hybrid I.T. professionals can be viewed as playing a similar role between the latest I.T. initiatives, technologies and their potential and management. They provide management with access to the domain of I.T. knowledge, technologies and skills by translating them into a more commodified, whilst still symbolic, form that management can relate to. It also involves, according to Carter & Scarbrough (2000b), being able to apply their knowledge and skill in a specific context i.e. into the service of a particular organisation.

Hybrids thus bring knowledge about how to use and apply I.T. to managerial and business problems. They provide a translation of I.T., help to justify it and put it into managerial and organisational language. Hybrids have this opportunity because of the seemingly inherent uncertainty and difficulty of the I.T. world – i.e it engenders techno-fear and is associated with increasingly complex systems. I.T. is thus on the one hand inherently un-businesslike while on the other being perceived as central to organisational efficiency and performance. Management is in the difficult position on both needing I.T. and being opposed to it; I.T. appears both to be the answer and the problem.

In effect, hybrids are expected to merge the managerial and technical regimes of knowledge, with each adding credibility to the other. One provides the other with ammunition: I.T. gives management a tool for efficiency; management makes I.T. strategic by linking it to organisational success. More widely Exworthy & Halford, (1999) talk about a fusion of managerial and professional discourses, they argue that managerial competence is becoming increasingly necessary for professional groups in general. Managerial professionals or hybrids in effect act as buffers between rank and file professionals and higher management. It appears that the managerialist

regime merges and intersects with, rather than displaces, professionalism (Clarke and Newman).

This is not only a conflict that is internal to the I.T. occupation, but one that is part of a wider political and economic context. The emergence of new managerialism can be seen as part of new right politics with its emphasis on commercial and market forces. This political climate has been characterised by the enterprise culture and the rolling back of the state (Carter & Scarbrough, 2000a). It has led to conflict with other professions between their professional skills and knowledge and managerial initiatives and concerns; most notably those within the state sector and newly privatised industries (Carter & Scarbrough, 2000a; Cohen, Duberley, & McAuley, 2000; Exworthy & Halford, 1999). Indeed Reed (1996) has noted that the politics of the new right is hostile to organised professionals in general as they curtail free market forces.

Whether or not professionalisation and managerialism are polar opposites is not the issue unlike in Cohen et al (2000), the point is that, however stereotyped the polarisation of the two may be, they are used by managers and researchers in this way and thus take on a position of tension and opposition to one another. Having at least partially constructed the world in this way, managers can then value those that can overcome the tensions inherent in their construction. Therefore, hybrids who can apparently bridge these poles are valued. They are the interpreters and reconfigurers who enable the technology to be adapted to solve managerialist determined problems – or in Scarbrough's (1993) terms they create problems and solutions that appear to address managerialist issues. More broadly they are finding this middle ground between stability and flexibility; permanence and change. They are still bounded by the organisation, business and a managerialist agenda, but are not bounded by their discipline. The occupation follows the construction of its work. Managerialism can coexist with technical-professionalism and it is with hybrid personnel that their co-existence is embodied. There may be compromise and collaboration (Exworthy & Halford, 1999) although possible not "consistency and complementarity" (p481, Cohen et al, 2000)

5.7 GIBBONS ET AL'S MODE 1 AND MODE 2 KNOWLEDGE

Gibbons et al (1994) present two modes of knowledge production. Although their argument that there is (or should be) a fundamental movement in the actual production of knowledge from one mode to the other is unconvincing, it does add to

the commentary on changing economic and social values. In particular, their description of mode2 knowledge production aligns remarkably well with the skills and expertise that the managers in this study valued in I.T. workers. The table (Table 5-2) below illustrates the contrasts that Gibbons et al make between mode1 and mode2.

Table 5-2: Contrasts between mode1 and mode2 knowledge production (Gibbons et al. 1994)

Mode1	Mode2
Science and Scientists	**Knowledge and Practitioners**
Academic - problems are set and solved by the academic interests of a specific disciplinary community.	**Practical** – problems are found and solved within the context of application. Such knowledge intends to be useful. It is a problem-solving approach.
Disciplinary – distinguishes between what is fundamental and what is applied – theoretical core leads to knowledge that may possibly then be applied.	**Transdisciplinary** – involves the integration of different skills – flow is back and forward between fundamental / theoretical and applied / practical.
Homogeneity	**Heterogeneity** – in terms of the skills, experience, knowledge and institutions that make up the problem solving team (according to the problem's requirements).
Discipline defined problems and relatively fixed institutions.	**Transient** problems and short-lived groups.
Hiearchic	**Heterarchical**
Quality – peer review of contributions. Disciplinary control over problems, techniques and who is judged qualified to work on them.	**Socially** accountable and reflexivity permeate the whole production process. Sensitivity to the impact of the research. Utility value.
Diffusion through organisational channels, academic journals & networks.	**Diffusion** through practitioner networks.

In line with mode2, managers wanted knowledge and skills that were contextual, practical and applied, rather than the abstract and theoretical knowledge that is more indicative of mode1. Thus managers valued trans-disciplinary knowledge and skills, in particular the trans-disciplinarity that could integrate technical, organisational, business and managerial knowledge and skills. Mode2 knowledge is created within the broader social and economic context rather than specifically within universities or research institutes. Likewise, the managers in this study valued experience gained within the world of work or even within life generally rather than via training and education. The value of education, or at least higher education, to managers was mostly its generic learning, motivational and time management skills rather than discipline specific knowledge. Indeed the managers in the study were mostly happy to take graduates from a variety of different disciplines. Also the problems and tasks that managers faced were not set within a disciplinary framework, rather they arose in the context of application i.e. within the organisation and likewise their solutions arose out of that context. Mode2 knowledge is generated in non-hierarchic, heterogeneous

teams, which are essentially transient. The managers in this study largely reacted against a bureaucratic type hierarchy. They valued staff who were empowered, they valued multi-skilling and flexibility and some spoke of people coming together to accomplish particular tasks whilst a couple specifically mentioned virtual teams. They, particularly company managers, did not want staff in fixed bounded structures and jobs; they wanted flexibility.

Conversely, mode1 is comparable to the things that the managers in this study reacted against. For instance, as just mentioned, managers were careful that their companies or departments should not be perceived as old-fashioned, bureaucratic, inflexible organisations. Similarly, they did not value typical techies who would stick within the boundaries of their discipline. Techies were by comparison to those with more of a mode2 outlook, rigid and inflexible, within their technical world they dealt with certainty and fact.

As with mode2 knowledge production, managers seemed to be calling for the discovery, application and use of I.T. knowledge to become more closely integrated. They wanted I.T. innovations that were useful and solved identified problems. Gibbons et al state that:

> "whereas value use to be added by developing technologies that would allow for economies of scale, now these economies need to be augmented or replaced by economies of scope, arising from the application of skill and insight into configuring resources, particularly knowledge resources, in novel ways, and doing so not singly, but continuously" (p63).

This description applies well to the development of the I.T. industry already outlined in section 2.1.2 of the literature review. So for instance, where once I.T. technology offered automation and economies of scale and the power came from the relatively fixed hardware, it now comes from the ability of computer personnel to harness the technologies and integrate them in novel ways to help many different types of organisation. And indeed, as Gibbons et al imply, this seems an endless task. Like Gibbons et al, Reich (1991) also points out that value has shifted within society from those who create knowledge to those who configure it. Likewise, the success and power of the I.T. industry appears to lie in its creation and customisation of essentially similar products for a particular organisation, department or even user. The industry appears to be selling its ability or potential ability to continuously reconfigure its knowledge.

Hybrids are the people within I.T. who enable this continuous reconfiguration. To be technically able is not enough because to reconfigure the technology for a particular user you have to be able to understand that user, understand their world and communicate with them. As the main user of I.T. is the organisation and the organisation (even if public) now appears to be in "business," this amounts to hybrids ability to understand and communicate with business. Hybrids thus reconfigure I.T. knowledge with business knowledge to meet organisational or managerial needs and solve their problems.

Although Gibbons et al's analysis acknowledges the links between commercialisation, business and markets with mode2 knowledge they seem overly impressed with mode2's seeming flexibility in response to market demand and the use of the market mechanism to allocate resources, ensure quality and to lead to social accountability in knowledge production. It seems that a much more critical interpretation is in order, one that recognises mode2 not only as an alternative view from say mode1 but also one that is value-laden and not necessarily better or a step forward.

Consequently, these "needs" and "problems" that I.T. appears to solve do not just exist. They are created and perceived. Abbott's (1988) work shows how experts seek to define and offer solutions for the emergent problems of organisations. Such problems are seized by expert groups through their apparent proximity and connectivity to the groups' existing knowledge and tasks. Thus the I.T. occupation competes with others to "make something" of emerging problems and by doing so extend their control over areas of work. This leads Scarbrough (1993) to suggest that problems and solutions emerge together, the problem being defined by the expert group in accordance with the solutions that it can offer. He sums this up by saying that "groups select problems for their consequences, and problems select groups for their expertise" (p950).

As Scarbrough (1993) points out, the hybrid concept may be one such problem-solution: "by highlighting an enhanced business contribution from IS through changes in career patterns, it projects a wider range of career routes for IS experts" (951). Thus hybrids are a problem-solution which when viewed as a construction of the I.T. community can be seen as facilitating its agenda. However, the continuous reconfiguration of I.T. and business knowledge can also be seen as offering managers the possibility of furthering a managerialist agenda. For instance, I.T. is closely linked to increases in efficiency and productivity and holds out the possibility of up to date information (Pollitt, 1990). In particular, I.T. plays an integral part in the

discourse of modernisation and change, which is inherent to managerialism (Clarke & Newman, 1997).

This shows the importance of problems in the social construction of knowledge and in occupational change (Scarbrough, 1993). More widely, the role of expertise and expert groups in today's society, according to Reed (1996), is to mediate the radical doubt and uncertainty that is inherently part of a Western society that accepts all forms of knowledge as provisional and prejudiced. Likewise, according to Scarbrough (1993), expert uncertainty absorbs the existential uncertainty of a particular condition then reintroduces it as an operational uncertainty to be controlled by a suitably qualified and competent expert. Thus, I.T. hybrids promise managers a level of control over an increasingly unmanageable environment. They take the uncertainty inherent in the business environment and turn it into a technical-managerial challenge that they can rise to.

6 CONCLUSION: CONTRIBUTIONS REFLECTIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

6.1 CONTRIBUTIONS

This research set out to investigate "what makes a computer professional valuable?" In other words, according to managers, what skills, attributes and knowledge are computer professionals perceived to have that are of value to the organisation? The study has investigated and given an understanding of this individual value of computer professionals. It has indicated the meaning structures (e.g. managerial, bureaucratic and technological) and common themes (see section 4.2) used to define what is valued and what is not. It has shown how the construction of individual value is influenced by various contexts: the organisational context within which managers are situated; the computer industry and the computer profession within which computer personnel work; and the wider value systems and worldviews available. The value of certain skills and knowledge within the computer occupation is not a constant, not surprisingly it changes over time and space and is related to wider changing value systems. This thesis shows how individual value within computing is constructed as valuable within today's context. Specifically it makes five main contributions to furthering our understanding of and knowledge about I.T professionals and the I.T occupation. These are listed below and explained more fully in relation to the literature in the text that follows.

1. Firstly it finds that managers' perceptions of the value of computer professionals are influenced by two main perspectives: managerial and technical. The managerial perspective is dominant and is constructed in opposition to the technical perspective which is more traditionally associated with influencing and defining the IT occupation.
2. Secondly it finds that both the technical and managerial perspectives are male perspectives and consequently leave little room for women computer professionals to be judged as valuable.
3. Thirdly it finds that the managerial perspective is adopted to different extents by those managers working within computer companies and those within computer departments. Given the dominant nature of the managerial perspective it is suggested that this lack of adoption may make those computer professionals working within computer departments less valued members of the profession.
4. Fourthly it suggests that these tensions between managerial and technical perspectives are embodied within the concept of hybrid computer professionals. This helps to clarify what is meant by hybrids and helps to explain the difficulty of developing them.
5. Lastly it argues that the concept of regimes of knowledge provides a useful way of analysing individual value within the computer profession.

1. A Managerialist Perspective on Individual Value

Other studies have looked at individual value within the IT profession in terms of what skills IT people have and what skills managers and industry want. Much of this research is seemingly initiated because of a sense of dissatisfaction with computer personnel. It takes a deficit approach, concluding that computer professionals lack some essential skills and qualities and that they need to change. To a certain extent this study confirms the results of this research. Similarly it finds that, according to the managers interviewed, computer professionals lack business, organisational and commercial skills. They lack an understanding of the organisation for which they are working and therefore don't readily create computer systems that are useful to the organisation. Although as I just said it is not surprising that what is valued within computing changes over time and space, previous studies and reports about computer professionals skills and knowledge don't seem to address these changes – those written more recently (e.g. Dench, 1998) present a similar picture to those written in the 1980s (e.g. Connor et al. 1986) and both talk in terms of a fairly consensual, unitary view. Likewise these studies largely do not consider the influence of wider value systems and the contexts within which skills and knowledge are judged to be lacking. The lists of attributes that they present therefore lack the depth and meaning that can only be attained by the inclusion of context.

This study has taken a more holistic and exploratory stance. It has not assumed that computer professionals are lacking and that they therefore need to change or be developed. It looks at the claims that certain skills, knowledge and attributes are valuable within the context within which the claims are made and thus gains an understanding of how individual value is constructed within and influenced by certain contexts. The study finds that these different valued skills and attributes (as presented in section 4.2) and managers' explanations of their value are related to one another via an underlying logic, that is, they appear to be constructed as valuable from a managerialist perspective (see section 2.1) and thus can be seen to derive their meaning and coherence from this viewpoint.

It may not seem surprising that managers are influenced by a managerialist perspective but the thesis also shows that this perspective is constructed in opposition to the technical perspective. Managerialism is not allowed sole reign within the managers' views of the world. It hasn't displaced other views, rather it sits alongside, or more accurately competes, with other meaning systems. Consequently this perspective does not just endorse skills and knowledge that are different from those more readily associated with computer professionals, it is opposed to the

technical viewpoint which has traditionally helped to define the computing occupation (see section 2.2.4). Thus it not only promotes business values but actively downgrades and dismisses technical values. One specific implication of this research is that this competition of value systems makes it difficult for women computer professionals, or indeed those who are particularly technically orientated, to be counted as valuable – see contribution 2 below.

It is suggested that this opposition between the two perspectives may lead to many of the tensions surrounding the I.T. occupation that have been highlighted in this thesis – tensions between business and the IT industry; the organisation and IT department; managers and I.T. professionals and IT personnel and business people. It is also reflected in tensions within technical careers whereby competent technologists are expected to move into management roles.

1. One contribution of this study is therefore to take a more questioning view of individual value within I.T. and to place the study of I.T skills and knowledge within a wider context. The politicised and contentious nature of what is defined and counts as valued skills, knowledge and abilities within I.T. is highlighted and the construction of individual value illuminated. In particular this study shows that the construction of individual value is heavily influenced by a managerialist perspective which supports certain skills and knowledge whilst downgrading or ignoring others. However, although a managerialist perspective is used by all managers it is not the sole perspective; it competes with other value systems, particularly the technical. It is suggested that this ongoing competition between perspectives within the occupation and the organisation leads to many of the tensions around the IT occupation outlined in the literature review and accounts for the continued calls for the improvement or inclusion of certain skills and knowledge within I.T.

2. The Continued Exclusion of Women from Computing

Research has shown that women find technical work problematic and alienating. Likewise this research confirms that, at least according to the perceptions of the managers interviewed, women tend to work within certain more people-focused areas within computing and that they also avoid certain more heavily technical areas. Literature also suggests that the traditional technical fascination within computing is not only problematic for women but is also not what industry wants. It suggests that a more "feminine" computing occupation may be more appropriate. Thus the pressures that the computer occupation has been under to change would appear to open up possibilities for greater numbers of women entering the occupation and for recognition of their abilities as valuable.

However this research argues that technical pressures within the occupation still work against women. In addition, the pressure for change and the alternative construction

of individual value that comes from a managerialist perspective does not necessarily help women to fit or succeed within the occupation. These two opposing perspectives which influence managers' constructions of individual value leave no space for women's abilities to be recognised. Rather women's abilities end up neither fitting with the technical nor with the managerial perspectives and therefore they are largely ignored. In particular the career path outlined by managers which incorporates pressures from the managerialist and technical perspectives appears problematic for women (see section 5.2). Not only might certain work within computing be alienating for women but so might the perceived development expected through a computing career.

Consequently the findings of this study contribute to gender research on women in male dominated professions and specifically to literature on women in computing. They suggest an explanation for why there will continue to be many fewer women than men within the computer occupation and why those women within the occupation may find it harder to advance their careers.

2. One specific implication of this research is that both the managerial and technical perspectives are largely male perspectives. It is argued that this competition of value systems leaves little room for women computer professionals to be counted as valued.

3. Computer Companies vs. Computer Departments.

Although a managerialist perspective seemed to dominate managers' constructions of the individual value of computer staff it was recognised and used to a different extent by different managers. In particular those managers who worked in computer companies appeared to "buy into" this perspective to a greater extent than those who worked within computer departments situated within a wider organisation. Departmental managers were shielded from the external commercial and market demands of a managerialist perspective by their situation within departments in organisations whose main business was not I.T. They also had less opportunity to respond to this perspective because of the lack of market influence between their department and the rest of the organisation – attempts within organisations to sell the services of the IT function to other functions with the organisation have proved problematic (see section 2.3.4.) and in these researched cases not heavily implemented.

More generally it is suggested that managers in IT departments were relatively buffered from external influences. So for instance as well as being rather cut off from market forces they also appeared somewhat cut off from the wider IT industry. Thus

they were also somewhat isolated from the technical values of the wider occupation and less able to respond to the latest technical initiatives. Departmental managers appeared more focused within the organisation than the company managers and in addition to managerial and technical perspectives used the notion of providing a service and supporting the organisation to help to construct a rationale for the individual value of their staff. Thus whilst departmental managers recognised, acknowledged and used the managerialist perspective in their constructions of individual value, the organisational system within which they worked seemed to blunt rather than reinforce its values. The organisation and different types of organisation thus mediated the impact of external value systems on the organisation and those within it.

Nevertheless the managerialist perspective seemed to dominate constructions of individual value within the occupation. Given that computer company managers were able to and did adopt this perspective more fully, computer companies appeared to be the more "normal" environment for computer professionals to work within. In contrast computer departments appeared as rather passive and somewhat second rate (See table 4-3 and section 5.4). The staff within them also seemed in danger of being regarded as second rate. In particular computer departments emerged as particularly difficult places within which to enact later career phases. These later career phases were those in which the individual was becoming more valuable and more like the ideal hybrid that managers wanted. The possibility suggested from the literature that those working in computer companies may be perceived to have greater individual value (see section 2.3.2) is therefore borne out by this study.

In addition research literature that suggests a distinction between autonomous (professional) and heteronomous (non-professional) organisations is supported and the differences between them are illuminated by this study. These two types of organisations, computer companies (professional) and computer departments (non-professional), appear to offer quite different working environments in which managers construct individual value in different ways.

3. A third contribution is to show that a managerialist perspective is not uniformly adopted by all managers in the study. In particular those managers within IT departments appeared less influenced by and less able to respond to this perspective. Thus in keeping with the literature two types of organisational environment emerge from the study – autonomous (I.T. companies) and heteronomous (I.T. departments). Managers within each were found to have distinct conceptions of individual value – see table 4-3. It is suggested that this distinction was partly due to the differential influence that external value systems had on managers within these two types of organisation - I.T. departmental managers and their

departments appeared relatively isolated from these value systems. Consequently, given the influence on individual value within I.T. of a managerialist perspective, and to a lesser extent a technical perspective, I.T. departments emerged as somewhat second rate working environments, i.e. ones in which it was harder to enact a "good" career and to be perceived as valuable.

4. What are hybrids and why are they difficult to develop.

As much as technical skills were downplayed by the managers in this study, they were also recognised as a somewhat necessary evil. The conclusion of much previous research and the managers in this study is that what are needed are IT hybrids who can combine business and technical skill sets. On the surface this seems reasonable enough, although in practice the development of hybrid personnel seems less widespread than the continual calls for them would suggest that it should be. The literature presents quite a clear picture of what sort of person (in terms of skills, knowledge and abilities) is required and suggests ways that such a person might be developed (see section 2.4.7). However, both universities and employing organisations seem equally incapable of developing the IT employees that are required. Although previous research has noted the difficulty of developing hybrids and the apparent failure of education and business to do so, it hasn't really explained why this might be so. On the one hand developing hybrids is presented as a relatively simple task of combining these skills sets, on the other an almost strangely impossible one.

This research suggests that the difficulty of creating hybrid personnel is due to the wider context and that the lack of explanation of this difficulty is again due to the lack of consideration given to this context. The discussion and seeming simplicity of combining two different sets of skills, knowledge and values ignores the huge gulf and incompatibility between them. In effect they are aligned with different perspectives through which meaning and value are created or in Carter & Scarbrough's (2000a) terms they are aligned with very different and opposing "regimes of knowledge" (see section 5.6). On the one hand there is the professional technical regime which focuses on and supports an enthusiasm for computing technology. On the other there is the managerialist regime which focuses on making the organisation as efficient and successful as possible by attending to market forces and adding value.

As has been said, the managerialist regime also promotes an unfavourable image of the professional-technical regime. From such a perspective the professional-technical regime supports a somewhat blinkered, mechanistic, overly rational and objective view of the world. Likewise, computer personnel are inflexible, lack

adaptability and fail to appreciate the wider organisational purpose of their work. They are practical and hands-on. They are workers who require management. This regime is associated with an industrial age which is out of date, old fashioned and staid. In contrast the managerialist regime is aligned with the information or knowledge age. It is portrayed as having a much more realistic view of the world and the way that it works. The business world is characterised as fast changing and uncertain and therefore flexibility and adaptability are crucial for people and organisations and a certain level of pragmatism is prized. No surprise then if those with a more technical view of the world, or who have devoted time and effort to developing such skills and knowledge, do not warm to this perspective or feel that they want to or are able to become a part of its legions.

Nevertheless there has been some movement towards creating hybrid personnel. At the occupational level the IT profession appears to have become much more user and business orientated and tries to incorporate both technical and managerial values. However, the demands on the profession for movement have also increased and consequently somewhat masked this "success" or development. At the individual level hybrids do seem to be created although this is more a career movement from performing technical roles to performing more managerial-type roles rather than an actual synthesis of these two value systems within the same person at the same time. However whatever coming together is achieved or whatever the movement of individuals or occupations that is made, there still necessarily exists a tension between these two regimes. This tension is likely to manifest itself within the organisation and will need to be managed.

4. A further contribution of this study is therefore to show that the difficulty of creating hybrid personnel is partly due to the conflicting and diverse regimes of knowledge that they are required to unite: managerialist and technical. Given that the managerialist regime actively downgrades and tries to dismiss the world view supported by the technical regime, the task of bringing together these two regimes is extremely difficult and that of actually synthesising them ultimately impossible. Moreover the idea that hybrids might "solve the problem" seems misguided. Hybrids, or an IT occupation that incorporates these regimes and the tensions between them, might relocate or reinterpret the problem but at some point the organisation is still left with two disjoint views that need to be managed.

In addition to this greater understanding of the difficulties of creating hybrids this study also gives deeper insight into what is meant by an IT hybrid and why they are valued. In effect a hybrid is the person who can traverse, unite or in some way cope with the many tensions in and around the IT occupation. They are valued because they can successfully traverse various boundaries that are seen as problematic or difficult to cross. They not only hold the promise of uniting managerialist and technical perspectives; the organisation and the IT industry; business and IT and commercial and professional worlds but also act as intermediaries between the dynamism of business and the markets and organisational stability and certainty (see section 2.3.6). In many ways they personify the movement from old industrial world to the new information age. There may be few people who actually manage to successfully perform this role but the IT hybrid is held up as an ideal, something to aim for, and appears in danger of being perceived as a panacea.

5. Individual Value and Regimes of Knowledge

The tension between these two regimes can be seen at different levels. At the individual level this may manifest itself in different personality types and at the organisational level as tensions between the IT function and other more business orientated functions. At the level of the occupation it may look like an ongoing battle between two competing occupations (computing and business) over a jurisdictional area. Indeed Abbott's work on the "system of professions" provides a useful tool for investigating and gaining an understanding of the IT occupation and the dynamics behind the construction of individual value within it. However, computing and business are not neatly delineated occupations. There is certainly a battle here but it is probably better viewed as a battle between the regimes of knowledge that help constitute business and computing rather than between professions or occupations. This shift in perspective from professional jurisdictions to regimes of knowledge thus helps to broaden the discussion from one centring on professional knowledge and expertise to a wider discussion of different knowledges. It also enables a more critical view than for instance Gibbon's mode1 and mode2 views of knowledge (see section 5.7). In addition it makes for a more fluid and less bounded view of knowledge than either Abbott or Gibbons.

Thus thinking in terms of regimes of knowledge makes it possible to trace changes within the IT occupation and to think of the IT occupation as one that now encompasses conflicting regimes of knowledge. It also makes it possible to trace the influence of these regimes across different contextual levels (micro, meso, exo & macro – see fig 2-1) - so for instance changes in the IT industry over time can be linked to organisational pressures but also to changes in wider value systems. In addition, thinking in terms of regimes of knowledge makes it possible to look at the relationship between different regimes and the changes in this relationship. For

instance the technical regime within computing can be seen to have links with science, engineering and mathematics, and the managerial regime with quite different areas i.e. business, economics and social sciences. Business is commercial and traditionally more professional occupations may have distanced themselves from the fluctuations and uncertainties that this implies (Abbott, 1989). However the links between computing and mathematics may be lessening whilst those between computing and business may be growing. Computing may be less a profession and more a type of knowledge work and knowledge work may also be more commercial and business-like than professions traditionally have been. Thus the IT occupation (and individual value within it) is defined by the regimes of knowledge that it encompasses and relationships between these regimes, each of which change over time.

Carter & Scarbrough (2000a) develop the concept of regimes of knowledge to analyse differences in knowledge management within a particular organisation between two time periods. This study uses it to account for constructions of individual value within the IT profession. Whereas they use a detailed case study for their data this study is broader, focusing on an occupation and includes interviews with managers from a number of organisations. Also whereas they find that the regime of engineering is replaced by the managerialist regime within their case study organisation, this study presents an ongoing conflict between the managerialist and technological regimes within the IT profession – (one which the computer profession may be benefiting from, see section 5.6 & 5.7). This thesis therefore supports Carter and Scarbrough's work. Similarly it highlights that knowledge is not simply contained within individuals or individual organisation but is affected by external factors. And likewise it finds the concept of regimes of knowledge useful. It also extends their work by showing how regimes may coexist and form tensions within and around occupations and their associated knowledge(s) as well as within and around organisations. Thus the concept of regimes of knowledge, covering as it does discourse, knowledge and power, when used alongside Abbott's work on the system of professionals provides a framework for analysing individual value and its development, one that includes different levels of context and one that necessarily employs a critical view.

5. Consequently another contribution of this study is the development of a framework within which to understand individual value within computing: a framework which enables the importance of context to be included and acknowledged, one that unites different contextual levels and one that shows the contentious and politicised nature of what counts as knowledge and skills. The study takes Abbott's work on the system of professions

and applies it to the IT occupation. It shows that Abbott's theory works well and has considerable explanatory power to trace the movement of the computing occupation over time and the forces that contributed to this movement – see section 5.5. However it also shows that it encourages a somewhat blinkered view (as does Gibbons notion of mode1 and mode2 knowledge) which concentrates on the occupation to the exclusion of wider political and social forces. I suggest that Carter & Scarbrough's concept of regimes of knowledge is useful here as it is less bounded and more fluid. This study takes the concept that Carter & Scarbrough used to investigate changes within a particular organisation over time and applies it to the I.T. occupation. Unlike their study where the regime of engineering is replaced by the managerialist regime, within the I.T. occupation the technical and managerial regimes are incorporated in a somewhat uneasy co-existence.

Overall this study gives an in-depth, contextual and critical view of individual value within the I.T. occupation which serves to increase our understanding of the occupation itself. It has considerable explanatory power, covering as it does a broad terrain whilst focusing on a specific theme of individual value within I.T

6.2 REFLECTIONS ON THE RESEARCH PROCESS

6.2.1 The Research Process and What I would do Differently

If I were to do this project again I suppose the main thing that I would want to change would be the time that it took, I would want to make the project quicker, to find shortcuts. Having said this though, I don't think given what I knew at the time and the circumstances that I was in that this would have been possible. Looking back it seems that I went through a somewhat necessary learning process.

On the other hand if I were advising someone else conducting a study that was exploratory and aimed at gaining understanding then I would encourage them to see it as an iterative process whereby you come to understand. I would advise them to start by identifying a range of bodies of literature that seemed relevant to their topic and to find out roughly what was being said within those areas. Although I would also encourage them to write this up in order to help make sense of it and as a record, I would not at this stage encourage them to produce, or think in terms of producing a conventional literature review.

I tried to follow a more traditional route of using the first year of my studentship to review the literature within the area and wrestled quite a lot with trying to achieve this whilst not knowing what literature was relevant. Although I think that this "not knowing what literature is relevant" is somewhat inevitable at the beginning of any doctoral research, I think that in my case the task of trying to produce a literature

review made me focus on what I was pretty sure was relevant – literature on computer professionals and their skills and that on technical careers – rather than looking more broadly. A broader sweep of the literature would have given me a better sense of what the possible scope of the research was and where it might go. It would have opened up ideas and possibilities which I think my more circumspect review cut out. I think that had I had a model of the research process that started off with a "broad brush" getting to know the literature stage this would have been helpful, if possibly a bit vague.

Towards the end of this first year I also produced an outline of my methodology. The data gathering went well and I don't think that I would do anything differently. I wouldn't add any particular questions, interview any different people or change any individual interview.

With the analysis of the data I really would have liked to have found a short cut and did a lot of searching for one. Again though under the circumstances I'm not sure that I could have done anything differently. I had difficulty analysing the data in anything more than a superficial way. At a very literal level my data came up with similar findings to a lot of other research. My findings thus seemed "correct" because they were corroborated but also uninformative. However, I didn't have a clear alternative idea of what my analysed data might or could look like. I was troubled in the analysis by the idea of moving too far away from the data. To move away from this literal analysis into anything more insightful, which was what I wanted, I seemed in danger of just simply giving my opinions.

In the hope of breaking the deadlock I then spent quite some time reading about qualitative research methods and qualitative analysis and the philosophical underpinnings of qualitative research. This I found very interesting and certainly up to a point helpful, although the research data and analysed data presented within these writings often seemed very descriptive and narrative and didn't closely match up with my data or what I was trying to investigate. Research that was closer to mine seemed to say how data was gathered and what the results and conclusions drawn from the data were but didn't show how the data was actually analysed. On reflection I think that I spent too long reading around this area. At the end of this process I did produce a methodology chapter and felt that I knew a lot more but still didn't feel that I had made any headway with the analysis.

Although I still wasn't sure what I wanted to say I set about writing up my analysis of the data. The writing process helped to clarify my thoughts and brought into mind

other ideas that otherwise wouldn't have occurred to me. However, again I think that I spent too long dong this. I was aiming for a "written up" analysis of the data rather than viewing this write up as part of the analysis process. Part of this need for closure was internal - needing to feel that I had made progress and to have some of the uncertainty lifted – and part external - institutional and departmental deadlines and expectations. Although producing this write up of the analysis was a step forward I found this "failure" to come up with "a write up" of my analysed data very difficult.

To get any further with the analysis I felt that I needed a better understanding of the literature. I think a turning point was when I finally went back to the literature and rewrote my literature review. However this was also very difficult as I was already "behind schedule", my initial literature review seemed so inadequate and there seemed so much more to do. I spent a long time reviewing literature and writing this second literature review. Unlike the time spent on the initial literature review, on the analysis and on the qualitative research readings, this did seem worthwhile and necessary. Also my review of the literature could now be guided by my data and analysis of that data. I could now look for what the literature said that was specifically relevant to my study rather than to a study.

The process of rewriting the literature review also gave me ideas which helped to clarify what my data were saying. When I came back to the analysis I had already written I found it more meaningful because it was now contextualised; I now had in mind where the literature had led me (or where I had led the literature). I could now rewrite that analysis to make this extra meaning clearer and to incorporate themes and thoughts derived from the literature. Ultimately I found that having the data helped with the literature review and the process of conducting and writing up the literature helped with the analysis. The discussion and contributions were certainly only made possible by what went before.

6.2.2 My Values and their Effect on the Research Process and Research Outcomes

The conflict when analysing the data between the extent to report what was being said by the interviewees and how much to interpret now doesn't seem such a problem. It seems obvious that the analysis of the data were going to consist of my interpretations. However, this doesn't make them "just" my opinion, which was something that I was concerned about. They were interpretations that were formed through extensive work with the data and with the literature. The analysis process consisted of ongoing rechecking and questioning of myself about the interpretations

to ensure that they were what I had understood from what the interviewees said and that they were what I believed was going on. This is an example of a fundamental part of the whole research process which involved checking and challenging my developing ideas and beliefs.

My values obviously influenced what I chose to study, the research questions that I asked, the literature reviewed, the way it was used and the analysis and findings drawn. This is not to imply that they were the sole influence or to imply that the research process was somehow a completely internal affair. A major part of the research process, I believe, was to open myself up to alternative points of view via the literature, the questioning that comes from reading and writing that up, the interviews with the managers, the analysis process and supervisors' comments. Indeed it was this ongoing questioning, reviewing and reflecting on what I thought and meant that seemed to form a major part of the process and often made the work and progress seem slow. If it had been just a matter of using the literature and the data to confirm what I already thought this would have been considerably easier and quicker.

Each step of the way the choices made were influenced by my values and beliefs. The literature read and reviewed was chosen because it was of interest and meaning to me. Obviously it was also chosen because it was of relevance to the project but that relevance was likewise my interpretation. However it is an interpretation of relevance that I then had to explain and justify to myself and others by writing it down. It could then be checked and questioned by others and that feedback incorporated. The resulting literature review, although its name implies a presentation of literature that is out there, was therefore my unique and individual construction.

Likewise, given that the outcomes were the result of a process that was so affected by me as the researcher the outcomes are inevitably heavily influenced by me and my values. However again there is no way that I could have got from the research questions to my analysis and discussion purely using my own internal reflections and imagination, this required interaction with the outside world. Similarly as well as the research process revolving around me and my beliefs it inevitably changed me. Thus the whole research process was a reflective process.

I have learnt a lot about the process of research and would like to think that if carrying out a similar piece of research I would be much more confident about what I was doing and would find it much easier. Certainly I think that the research process that I have outlined above is very different from the model used and taught on my undergraduate psychology degree course. In that model the research process, and

via it the world investigated, appeared to be much more structured and circumscribed. I feel rather brave to have moved away from that world to tackle the "real world" where things are much less certain and well defined. I secretly cherish the idea that a more psychologically based study would have been so much easier and that I've taken up the challenge that qualitative research holds for "psychologists" and succeeded in crossing between these two worlds. I feel that I have stretched myself by crossing the quantitative / qualitative divide in social science. However, given that a major motivation at the start of my doctoral studentship was to learn about qualitative research, and that I am quite flexible and don't like to think of myself as pigeon-holed in any particular way, this perceived movement and success very much fits with my view of myself and of the world.

6.3 LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

An obvious extension to this research would be to investigate further the workings and outcomes of this battle between managerial and technical regimes of knowledge within IT. An in depth case study of an organisation that aimed to show how this tension impacted the individual, the group and the organisation would be interesting. It might be particularly useful and illuminating to use a computer department (as opposed to a company) for this as they seem to be particularly problematic areas.

A second extension to this research might be to investigate further members of the IT occupation and their managers' perceptions of computer departments and computer companies as environments within which to work and within which to develop an IT career. This could look at differences between perceptions of the two and for perceived differences in the individual value of staff within each. It might also look at the potential effects on people's career of working within one or the other.

This research very much relies on the interviews with the 24 managers. Although this is not a problem in itself, it would be interesting to interview others, particularly a group of I.T. professionals themselves and compare their comments about their own and others capabilities and careers with those of the managers in this study. Such a study could include I.T. professionals who work within a similar range of organisations as this. It could also start out with a focus on possible occupational and organisational; technical and managerial; and professional and commercial differences and tensions.

Another main area not covered by this research would be to look more closely at the effects of company size and work-group size on people's perceptions of individual

value and its development (their own or others). Although this research has included a range of company and work-group sizes, as acknowledged, the smaller I.T. companies were rather special and probably not typical. It would be interesting to investigate I.T. professionals within smaller companies and to interview them and their managers about individual value and its development.

It would be worth exploring other possible differences between different departments and different companies other than size. For example, by considering whether the two types of organisational environments identified here can be further sub-classified. Although departments in both public and private organisations were included in this study, no discernible difference was found between the comments of their managers. However, as there were only two public organisations (out of the eight departments) and these departments seemed quite different from one another, this study does not provide much data on this topic.

The hybrid concept, Abbotts's (1988) system of professionals and Carter and Scarbrough's (2000a) regimes of knowledge could be used to investigate other professions and organisations, especially those, like computing, in flux; those where there are openings for jurisdictional battles. Some examples follow: in healthcare, where nurses are becoming more academically trained, more responsible for patient care and more managerial; in academia, where academics have become consultants and entrepreneurs; and in the ex-nationalised industries, like the railways, where the focus has shifted from workers to customers yet from service to profit.

In particular, research could investigate computer professionals who seem to be hybrids and could explore how their skills and careers have developed and the extent to which they fulfil the role portrayed for them within this study.

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