



Women, office work and computerisation : case studies in user-involvement during systems development.

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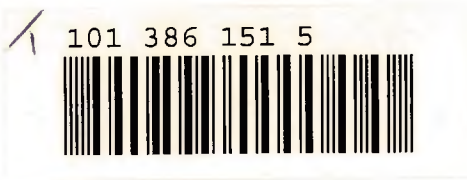
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WOMEN, OFFICE WORK AND COMPUTERISATION:

CASE STUDIES IN USER-INVOLVEMENT
DURING SYSTEMS DEVELOPMENT.

JENNIFER OWEN.

A Thesis submitted in partial fulfilment of the
requirements of the Council for National Academic Awards
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WOMEN, OFFICE WORK AND COMPUTERISATION:
CASE-STUDIES IN USER-INVOLVEMENT
DURING SYSTEMS DEVELOPMENT.

Jennifer Owen.

Abstract.

This thesis examines the area of user-involvement in the development of computerised office information systems, with particular reference to gender relations and to initiatives in 'Human-Centred' systems design. It is based on a review of literature in computer science and in social science, and on case-study research. The thesis forms a contribution to the interdisciplinary work of the Human-Centred Office Systems Project, at Sheffield Polytechnic.

Interdisciplinary research into information systems development is expanding, partly in response to evidence that many systems fail to meet their stated objectives. There is increasing emphasis on issues of 'user relations', including user-involvement. In offices, as in other contexts, women tend to be defined as users or operators of technology; however, there has been little research into the constraints and opportunities women office workers face specifically in connection with information systems development. Previous projects within Human-Centred Systems research have been located in areas in which men predominate, such as printing and engineering.

The thesis makes a contribution to new interdisciplinary research on information systems in two main respects. Firstly, the scope for clerical involvement is examined. It is argued that clerical skills and experience can form a strong basis for involvement in office systems design; in addition, managerial reliance on clerical skill and cooperation appear to increase, with the advent of on-line, integrated office systems. However, the case-study research also illustrates the ways in which gendered associations can play a part in the definition of 'social' and 'technical' aspects of systems development, tending to marginalise clerical contributions.

Secondly, therefore, the thesis examines the potential of Human-Centred systems development approaches to address gender inequalities in opportunities for user-involvement. Methods for establishing a Human-Centred approach in a local authority department are proposed; an assessment of their use, in a case-study context, exposes a weakness in the Human-Centred tradition in relation to management practices. In conclusion, specific proposals are formulated to support the creation of new links between organisational strategies on information technology and those on gender inequality.

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INTRODUCTION.

Background:

The research described in this thesis was funded, and initiated, within the broader framework of the 'Human-Centred Office Systems Project' (HCOSP), based in the departments of Computer Studies and Applied Social Studies at Sheffield City Polytechnic. Established in 1984, the project itself was shaped by two related sets of concerns. The first arose from labour process studies: the debates stimulated by Braverman's argument that in class societies, information technologies (and other technologies) would tend to be designed and used in forms that would deskill or displace human labour, enhancing managerial control over both manual and clerical workers. (Braverman, 1974; Zimbalist, 1979).

The second set of concerns arose from controversies within computer science, regarding the actual or potential role of 'users', in designing the computer systems with which they work. Very few office information systems are implemented and used as originally designed. Hirschheim (1985) for instance quotes a study by Mowshowitz (1976), who noted that in excess of 40% of information systems were failures. A 1979 study of the effectiveness of U.S. federal software projects found that, of an overall budget of \$6.2 million:

- 47% of systems were delivered but not used;
- 29% were paid for but not delivered;
- 19% were abandoned or reworked;
- 3% were used after changes;
- 2% were used as delivered.

(US Government Accounting Office, 1979).

In a recent study, Hornby et al (1991) described a very similar picture.

There have been diverging responses to these difficulties: an increasing reliance on formal, mathematical methods of software design and testing, in some quarters; and in others, challenging this approach, the argument that it is the social or organisational issues that need addressing, partly through increased user-involvement in the design of systems:

"The history of computing is rife with examples of computer systems which were introduced, only to find that they were not used because the social elements were not fully considered."

(Hirschheim, 1985, p.228).

Human-Centred Systems Research:

Human-Centred Systems research (HCS) has linked the social science and computer science concerns just outlined: it has produced a theoretical critique of technology-led systems design methodologies, and has also initiated practical approaches to the design of information systems, prioritising the skills, knowledge and experience of their eventual users. While other approaches, such as Human-Computer Interaction research, have also addressed questions of human skill, this has been very much related to ergonomic and productivity concerns, focusing largely on individuals and on individual workstation design and use. In contrast, Human-Centred Systems research has explicitly addressed the links between the design and use

of technologies, and broader patterns of social relations, within and beyond the workplace. With a framework of legislation which has provided some support for democratisation of work, the Scandinavian countries have offered favourable conditions for a range of research initiatives related to Human-Centred Systems design, encompassed within the 'Collective Resource' approach (Ehn, 1988; discussed in detail in Chapter Four). Within the UK., human-centred approaches have been identified most prominently with research initiated by Mike Cooley, and by Professor Howard Rosenbrock.

Cooley played a leading part in the development of the 'Lucas Plan' in the 1970s, within which workers at Lucas Aerospace drew up detailed proposals for the preservation of jobs through a shift away from military production, and towards a range of innovative and 'socially useful' products - heat exchange pumps, equipment for disabled people, a combined road/rail bus. Lucas management rejected the Plan, but some of the product ideas were taken up elsewhere, and the Plan itself subsequently influenced the development of employment and technology strategies adopted by the Greater London Council, and by other radical local authorities, during the late 1970s and early 1980s (Collective Design/Projects, 1985; Cooley, 1987). Cooley's work on human-centred systems design has focused both on philosophical arguments, regarding the centrality of human skills and creativity within design and production, and on the political and economic case for promoting socially-useful goods and services.

Rosenbrock's research, based at UMIST, has centred on the development and use of systems for Computer-Aided Design (CAD). Rosenbrock has been concerned to expose both the inherent weaknesses of systems which minimise the role of human skill and initiative, and their oppressive and degrading effects for those who operate them (Rosenbrock, 1983, 1984, 1989). Countering such implicitly or explicitly Taylorist approaches, he argued instead for the design of systems to foster 'human-machine symbiosis', complementing human skills and discretion rather than replacing them. His work during the 1970s led to the design of a CAD system to provide designers with enhanced technical information, extending rather than reducing the scope for the exercise of their own discretion. In a later article (1983), he illustrates how a medical 'expert system' may be used to support a doctor's diagnostic work, rather than displacing or overshadowing it. During the late 1980s Professor Rosenbrock collaborated with Mike Cooley and with many others, on a European Community-funded project concerning human-centred initiatives in computer-aided manufacture (Rosenbrock, 1989).

In contrast, a recent initiative, at Brighton Polytechnic, has developed human-centred design principles in a community education context (Gill, 1986). This 'Social Action Research' approach has sought to develop computer-based tools for participatory learning, with the active involvement of people normally marginalised from economic and technological initiatives: disabled groups, and groups of women of Black and Asian origin. In this example, the

'Parosi' project brought together community groups, systems designers and professional health workers, in the collaborative design of a knowledge-based system to assist with diet planning and health education. Brighton Polytechnic has also become a base for the coordination of European research and teaching initiatives in the area of Human-Centred Systems (Gill, 1990).

What, then, are the defining features of Human-Centred Systems research, to date? There are differences of emphasis between the three approaches referred to above; these are discussed in Chapter Four, in relation to broader trends within the whole area of information systems analysis and design. But there are two common, fundamental themes, within human-centred systems research:

- (i) an emphasis on human labour, knowledge and skills, seen as including important tacit and informal aspects; these are intended to take priority, within HCS processes of systems design and use. HCS researchers argue that it is neither possible nor desirable to replace all aspects of human labour through automation; instead, the aim is to produce systems which can complement and enhance human abilities. Computers are seen as tools to facilitate human purposes and activities - not as a means for controlling or modifying human labour;
- (ii) a recognition that this emphasis challenges a range of established interests, at different levels. Rosenbrock identifies entrenched scientific and technical cultures and paradigms as the main source of resistance to human-centred initiatives (Rosenbrock, 1983, p.129). Cooley,

coming from a trade union background and from the 'Lucas Plan' experience, concludes *"it is my view that [human-centred] systems of this kind ... will not be developed and widely applied, since they challenge power structures in society,... epitomised by the vast multinational corporations."* However, he does view the attempt to design such systems as an effective expression of resistance to degradation and inequality, and a powerful illustration of social and technological choices.

To summarise, therefore, Human-Centred Systems research to date has provided both a broad theoretical framework for detailed research, and a number of prototypes and broad policy initiatives. However, as Gill argues, this research is still at an early stage, and further theoretical and empirical work is needed. (Gill, 1990).

Gender and Human-Centred Systems Research:

A significant omission in Human-Centred Systems research to date has been the area of gender relations. The prominent initiatives associated with Rosenbrock and Cooley in the UK, as well as those based at the Swedish Centre for Working Life, have all focussed on areas of skilled craft work from which women have been systematically excluded in the past, such as printing and engineering (Cockburn, 1983; Walby, 1986). By implication, the areas of work in which most women are employed have not been seen as sufficiently skilled or substantial to be appropriate priorities for human-centred systems design initiatives. The 'Social Action Research' model described by Gill is an exception; but here the

theoretical focus is on cultural diversity, rather than on gender or employment; although the majority of the participants were women, gender relations were not an explicit concern of the research. (Gill, op. cit).

Recognising that existing research had not examined the opportunities for human-centred systems development initiatives in areas of women's employment, the HCOSP in Sheffield chose to focus upon clerical work. It is a major area of women's employment; estimates vary, according to the precise definitions adopted, but all suggest that over 30% of working women are employed in occupations defined as clerical (Walby, 1986). Office work is also a major arena for the continuing development and dissemination of increasingly complex software. The initial aims of the Sheffield HCOSP were both to develop sociological analyses of women clerical workers' experience of office information systems development, and to identify methods and techniques to facilitate clerical involvement in systems design. That is, the research project as a whole sought to contribute to the increasing body of interdisciplinary research, including 'action research' initiatives, which began to emerge during the 1980s in the UK and the USA, following the earlier Scandinavian initiatives (Greenbaum and Kyng, 1991).

Within this broad framework, this thesis was planned with the following objectives in mind:

(i) to carry out case-study analyses of women clerical workers' experience of office information systems development and implementation, and to examine their

perspectives as systems users, in comparison with those of managers and systems designers;

(ii) to assess the scope for women clerical workers' active involvement in the planning, design and implementation of new office IT applications;

(iii) to assess the scope for human-centred approaches to address issues of gender inequality, in connection with the development of new office IT applications, both at an organisational level and in a wider context.

Before outlining the structure and content of the thesis, however, it is relevant to clarify the ways in which the work undertaken by the HCOSP as a whole developed. The team's work was funded in two phases (1984-87 and 1988-91) by the Joint Committee of the Science and Engineering Council (SERC) and the Economic and Social Research Council (ESRC). The case-study research discussed in this thesis began during the first phase, in 1986, and ended during the second, in 1990.

For the research team, the emphasis during the first phase was on generating analyses of 'mainstream' information systems projects: in a major bank, for instance (Murray, 1986) and in a large engineering company (see Chapter Six of this thesis). At this stage, research themes were still defined with reference to the two frameworks referred to on page one: that is, a social science concern with potential deskilling or work degradation processes in association with IT, and a computer science concern with fostering increased user-involvement in office systems

design.

As the research proceeded into its second phase, however, there was an increasing need to acknowledge the limitations of these starting-points, with reference to gender perspectives. In specific terms, the research team began to move away from a focus upon 'adding-on' women office workers' experience to these existing theoretical approaches, and towards a more direct examination of gender relations in their own right, within processes of management, organisational change and office systems development. This second phase of research resulted in the production of an edited book collection, in which a range of analyses concerning gender relations and systems development processes are presented and compared (Green, Owen and Paid, eds, due for publication in Spring 1993).

I now turn to a short discussion of the key terms and concepts adopted in the thesis, before moving on to summarise its structure and content.

Key Terms and Concepts:

Information systems, information technology:

As computer software and hardware have continued to evolve, so the terms used in both popular and academic literature have altered too. The 'new technologies' of the late 1970s have become established as the 'information and communications technologies' of the 1990s, and 'computer services' personnel have sought to take on broader roles and definitions as 'information systems' professionals. It is relevant to recall here some of the important differences between the current generation of

computerised systems and earlier ones:

"..microprocessor-based systems are used extensively to handle text (not just non-verbal data) and, along with developments in telecommunications, can potentially integrate all functions at the core of office work - the collection, production, storage, manipulation, retrieval and distribution of information. They also 'collapse' the number of stages through which information has to pass (for example direct access via visual display units - VDUs - to a mini or even mainframe computer."

(West, 1982, p. 61).

Since Jackie West wrote this summary, of course, personal computers have been developed with processing power sufficient to enable individual users to access facilities and information previously available only through the large mainframe or mini machines to which she referred. The case-studies which follow, in Chapters Six to Nine, concern large-scale configurations of hardware and software, able to facilitate the integration of previously discrete functions and groups of people through access to shared databases. For consistency, I will adopt the terms which are now becoming common, in this area, and refer to 'information systems', to information technology (IT) applications, (rather than 'computer systems'), and to information systems development processes and methodologies. 'Information systems' can be entirely manual, clearly; but in this context I use the term to refer to those which include computer hardware and software.

Technologies, Organisations and the Labour Process:

Assessing the possibilities for human-centred office systems development initiatives in Britain, an early conference paper rooted the Sheffield research project firmly within the labour process perspective which has informed both Cooley's work and the Scandinavian Collective Resource approach:

"Ultimately, the success or failure of a human-centred approach in office work will depend on the ability of office workers and their unions to shift the frontier of control between labour and capital in their favour. Specifically, human-centred systems would have to be designed with full office worker involvement, and introduced as a result of independent trade union bargaining..."

(Bell et al, 1985).

While the labour process perspective has generated wide-ranging theoretical debates and empirical investigation, two sets of problems have also been raised, with immediate relevance to this thesis. To summarise - prefacing fuller discussion in Chapter One - these concern firstly, the concept of technology itself, and of the technology-organisation relationship, and secondly the area of gender relations.

Technology and Organisation:

Many early contributions to the labour process literature have been criticised for implying a simplistic and mechanistic relationship between labour, management and technological change (Knights and Willmott, 1990).

Problems here have included a tendency to over-emphasise the effectiveness and homogeneity of management actions, in the face of which workers appeared somewhat passive. This broad picture also tended to reflect a deterministic model of technology as having 'impacts' on society, in terms of employment levels, for instance, or of deskilling, or of increased centralisation of managerial control.

A range of empirical studies have illustrated a far more complex interplay of perceptions and actions, within and between groups of managers, workers and trades unions, than envisaged in some early labour process research. In addition, office information technology in particular has been diffused in a slower and more uneven manner than predicted in early optimistic or pessimistic projections (Webster, 1990).

At a theoretical level, developments in the sociology of technology have begun to acknowledge these issues, and to suggest alternative approaches. Hill (1981) concludes:

"In the first place, technology embraces all forms of productive technique, including hand work which may not involve the use of mechanical implements. Secondly, it embraces the physical organisation of production, the way in which the hardware of production has been laid out in a factory or other place of work. The term therefore implies the division of labour and work organisation which is built into, or required for efficient operation by the productive technique."

(Hill, 1981, p.86).

Mackenzie and Wajcman (1985) adopt a similarly broad definition of technology, encompassing three aspects:

- physical objects: a car, or a computer;
- the set of human activities within which particular objects are made or used: for example, steel-making, in the sense of what steelworkers do as well as the equipment they use;
- the knowledge required to operate and develop technology: *"technological 'things' are meaningless without the know-how to use them, repair them, design them and make them."* (Mackenzie and Wajcman, op.cit., p.3).

The main thrust of these arguments is to reverse the common question about the social implications or impacts of technology, and to ask instead *"what shapes the technology in the first place, before it has 'effects'... what role does society play in shaping technology?"* (Mackenzie and Wajcman, op. cit., Introduction).

This 'social shaping' approach, discussed again in Part One, rejects technological determinism, but does not adopt a wholly social constructionist approach. Instead, it seeks to analyse the ways in which technologies interact with the organisational and socio-economic contexts in which they are designed and used (Williams, 1990).

Within this perspective, then, it is possible to formulate questions for empirical analysis which move away from the view of office information systems as simply having either positive or negative 'impacts' on their users. It becomes relevant, for example, to try to trace out the ways in

which both designers' assumptions about office systems users, and users' own formal and informal activities, influence the software design process. At a broader level, analyses are now emerging of the ways in which a range of social and economic factors have shaped software developments, and professions, in the postwar period (Friedman and Cornford, 1989). In particular, these suggest that issues of 'user relations' (rather than constraints of hardware costs or software productivity) are becoming dominant.

Technology and Gender:

A range of feminist critiques have identified weaknesses in labour process theory, in relation to gender. These weaknesses have included the implicit use of a craft-based concept of skill, related to areas of work historically dominated by men, and an over-emphasis on domestic constraints as the explanation for patterns of gender segregation and inequality in the workplace. (Beechey, 1987; Phillips and Taylor, 1980). In connection with the first point, feminist contributions to the labour process literature have illustrated the ways in which clerical skills have been devalued, over a long period, and in which clerical jobs have become 'gendered' jobs, drawing on specific skills and abilities which tend to be more prominent in women's rather than men's socialisation and experience (Davies and Rosser, 1986; Gaskell, 1987). This is clearly relevant to the ways in which human-centred systems research itself has been 'socially-shaped', and I return to this theme in Chapter Four and Chapter Ten.

In relation to the second weakness within labour process theory, concerning an over-emphasis on domestic constraints or reproduction as explanations for gender inequality, there have been varying responses. Some have seen the issues in terms of 'women and technology', emphasising efforts to increase women's access to technology; others have focussed more broadly on technology and gender relations. Cynthia Cockburn's work, in particular, has illustrated the ways in which gender inequalities tend to be reproduced within the workplace, in connection with technological change. (Cockburn, 1983, 1985). These analyses have also raised general questions, concerning the theorisation of class and gender as distinct but interconnected sets of relations (Cockburn, 1986). This thesis is not designed to make a theoretical contribution to these specific debates; however, in Chapter One I briefly review their relevance in connection with human-centred design approaches, and with sociological analyses of the technology-organisation relationship.

Structure and Contents of the Thesis:

Parts One and Two of the thesis contain a literature review in social and computer sciences.

In Part One, I seek to clarify the background and context in which human-centred systems design initiatives, and office information systems development in general, take place. In Chapter One, I discuss the ways in which information technology has been seen as producing 'impacts' on office work, notably the job losses and

deskilling which have been salient concerns in research informed by labour process theory. A review of relevant literature indicates that neither the optimistic nor the pessimistic forecasts of IT 'impacts' have been fulfilled; instead, more complex questions have been posed, regarding the relationship between technologies and organisations. Although deskilling is evident in some settings, the office context remains sufficiently diverse to provide opportunities as well as constraints for initiatives in Human-Centred Systems research.

In Chapter Two, I turn to research in the area of gender and technology. Gender issues have remained somewhat marginal in most social science research on IT (Liff, 1990). Nevertheless, research into the ways in which gender relations are reproduced within the workplace itself poses important questions for emerging sociological analyses of software design and use. These analyses have only recently begun to address the process of information systems development, as distinct from implementation and use. Human-Centred Systems research needs to examine how - or whether - information systems development processes may also reflect or reproduce patterns of gender inequality in specific ways.

In Chapter Three, I review some prominent trends and developments within systems analysis and design research and practice. I take as examples three distinct sets of approaches which do address the question of user-involvement in information systems design, and discuss these in depth, in order to assess their implications from

a gender perspective.

In Chapter Four, I move on to discuss a range of recent, interdisciplinary approaches to information systems development. In particular, I compare examples of British research with a range of Scandinavian initiatives, some of which have set out to address gender issues.

Concluding the literature review at this point, I summarise the key issues which emerge for case-study investigation. I argue that there is a need to complement existing computer science and social science research on information systems, by examining the systems development process itself. Computer science research has tended to emphasise the development of prescriptive methodologies, rather than the detailed evaluation of systems development practices; social science research on information systems, on the other hand, has focused primarily on systems implementation and use. Analyses of clerical skills and labour processes indicate that these could provide a strong basis for clerical involvement in systems design; however, empirical research is needed to explore these possibilities, both at a general level, and from a specific gender perspective.

Part Three of the thesis opens with a discussion of research design and methods, in Chapter Five. I identify a qualitative research approach as appropriate, both for the in-depth analysis of office systems development processes, and for the formulation of new initiatives in human-centred office systems design. In the context of a broader discussion of the validity of qualitative

approaches, I suggest that the epistemological approach adopted within existing Human-Centred Systems research has many implicit parallels with recent feminist contributions to the literature on research methodologies. Chapters Six, Seven and Eight then provide detailed accounts of three distinct approaches to office systems development, comparing the perceptions and the experience of women clerical workers, systems designers and managers.

Concluding this third part of the thesis, I summarise a number of unresolved issues in the area of gender relations and user-involvement in office systems design. The importance of user-involvement is evident: Chapter Six provides a detailed account of informal clerical participation in a successful systems design project, while Chapter Seven documents some of the problems which arose from excluding users from another design process. However, the example described in Chapter Eight illustrates both the difficulties encountered in trying to establish broad user-involvement within the framework of a very conventional systems design methodology, and the ways in which such conventional approaches can tend to reinforce patterns of gender inequality.

The fourth part of the thesis moves on to investigate whether human-centred systems design approaches can create a stronger basis for addressing gender issues in connection with information systems development, than the approaches discussed in Chapters Six to Eight. In Chapter Nine, I address as a priority the earliest stages of systems development, during which key decisions are taken.

I describe and evaluate an innovative approach to user-involvement, planned and carried out by the HCOSP in collaboration with staff and management in the case-study organisation originally described in Chapter Seven.

In the tenth and final chapter of the thesis, I emphasise two main themes. Firstly, I discuss the ways in which gender inequalities tend to be reflected and reproduced during processes of information systems development. In this area, the research described here makes a new contribution to emerging analyses of the development as well as the use of software in the office context. I also discuss the ambiguities and the tensions which surround the issue of user-involvement in systems design, both within computer science literature, and in case-study examples. Secondly, I discuss the ways in which Human-Centred Systems research can contribute to establishing a clear basis for women clerical workers' active involvement in office systems development. Drawing on the innovative approach described in Chapter Nine, identify some preconditions for HCS initiatives; propose some general guidelines, in relation to integrating gender perspectives within Human-Centred approaches; and identify a number of appropriate resources and techniques. Lastly, I turn to the broader political and economic context, in order to assess factors which may promote the wider adoption of human-centred systems design approaches, and those which obstruct or inhibit it.

PART ONE:

INFORMATION TECHNOLOGY, GENDER AND CLERICAL WORK.

INTRODUCTION:

In this opening section of the thesis, I set out to identify and discuss a number of trends in recent research concerning information technology, gender and clerical work, which are directly relevant to initiatives in Human-Centred office systems design. In Chapter One, I review research which has seen information technology (IT) as producing a range of 'impacts' on office work, highlighting concerns both about employment levels and about office skills, deskilling and job satisfaction. Much of this research has emerged within the literature associated with responses to Braverman's analysis of technology and the labour process in capitalist societies (Braverman, 1974); these are some of the concerns which first stimulated research into Human-Centred Systems design (HCS). In Chapter Two, I move on to discuss research which has focused on 'women and IT', within the literature on women's access to, or exclusion from, technology more generally. I compare this with more recent research - predominantly from feminist perspectives - which has sought to broaden the terms of debate by analysing gender relations in connection with technology, seeing both men and women as 'gendered subjects'. In the final section of this chapter, I review some recent developments in the sociology of technology, and assess the extent to which links exist - or can be developed - between this research and research which has focused on women, or on gender.

CHAPTER ONE:

GENDER, INFORMATION TECHNOLOGY AND SKILL IN OFFICE WORK.

INTRODUCTION:

During the twentieth century, office work has become a major area of employment for women. By 1980, 30% of all women in employment were in clerical jobs, as compared with 10% in semi-skilled factory work, and 11% in semi-skilled domestic work (Women and Employment Survey, 1980, quoted in Dex, 1985). A report on IT and employment in 1982 estimated 36% of women's paid employment to be in 'office occupations' (SPRU, 1982). Within the clerical sector as a whole, women represent 70% of all clerical workers, and 98.6% of secretaries and typists (Barker and Downing, 1980).

This particular aspect of a more widespread increase in women's employment, while largely restricted to fairly low-paid and low-status jobs, has not taken place smoothly. Sylvia Walby illustrates this point, with a detailed historical account of the conflicts which have occurred between employers, trades unions and women workers, over access to office jobs and over rates of pay. Discussing the initial entry of women into the clerical workforce between 1800 and 1924, she concludes:

"Employer preference for women clerks for lower level work was confronted by male clerks' hostility to the entry of women to their established positions. The outcome was

the entry of women to the new occupational slots not already monopolized by men, and the rigid segregation of the workforce. These new slots were created at lower levels of pay and status than the old. Thus while men won their struggle not to have women in direct competition with themselves, employers won theirs to employ women at cheap rates of pay."

(Walby, 1986, p. 155).

Walby places this account in the context of a broader and more contentious argument concerning the theorisation of class and gender relations, to which I return in Chapter Two. In this chapter, my immediate concern is to consider the substantial literature which has emerged since the late 1970s, focussing on the observed or predicted 'impacts' of office information technology. Two themes have been prominent: firstly, the question of employment levels, and secondly, the area of skill, deskilling and control within the labour process.

In relation to both, dramatic and diverging estimates emerged during the late 1970s and early 1980s. 'Optimistic' accounts visualised both increased productivity and cleaner, more comfortable working conditions in the 'paperless office' of the future; wordprocessing systems, for instance, were to be "designed with secretaries and typists in mind, to make typing easier, more interesting and less frustrating" ('Wordplex' publicity, quoted in Webster, 1990). In a widely-discussed study, Bird (1980) predicted that word-

processing would facilitate an expansion in some secretarial roles, creating access for some women to managerial opportunities. Writers such as Curran and Mitchell (1982) reflected the view that employer and worker interests need not be in conflict, in connection with office automation:

"Jobs in the automated office rarely need to be less inherently desirable than their predecessors. In many cases, the mechanisation of routine operations should make the new jobs more interesting. Care needs to be taken, though, in designing the new working environment and methods. Employee involvement at this stage can pay off in terms of greatly increased satisfaction with the new system."

(Curran and Mitchell, 1982, p.128).

This consensus view has been embodied within some trends in information systems analysis and design methodologies, notably the 'Socio-Technical Systems approach, discussed in detail in Chapter Three.

In contrast, 'pessimistic' observers predicted both large-scale job losses, and deskilling and degradation, in a process in which automation would bring factory conditions to office work (Braverman, 1974; Zimbalist, 1979; Barker and Downing, 1980).

In fact, consideration of the two areas of employment levels and skill and control in the labour process reveals a more complex picture than those put across in either the

'optimistic' or 'pessimistic' accounts referred to above (Webster, op.cit.). I now turn to a brief review of these two areas.

1.1. Employment levels:

The optimistic, early assessments of the potential impact of office automation were challenged by many researchers who predicted large-scale job losses. Huws (1982) illustrated the scale of job loss which can accompany office automation, with reference to a large West Yorkshire mail order firm. Here, the 1100 strong clerical workforce was cut by half, following computerisation. Huws concluded that patterns of 'jobless growth' and 'natural wastage' make precise estimates and measurements impossible, but that, in general, the main reason for introducing IT was to increase productivity at the expense of jobs.

On the basis of more substantial research, West (1982) concluded:

"The most serious effect for women of new technology and the rationalisation of office work is undoubtedly fewer jobs... The increased segregation of office work along gender lines is also a definite trend, whatever the real content of low-grade jobs, and promotion is more blocked, both for clerks and 'typists'."

(Op.cit, p.80).

The most comprehensive survey of material in this area was provided by the Science Policy Research Unit at Sussex University, in their 1982 report "Microelectronics and Women's Employment in Britain". As may be seen from the report, 'office occupations' represented the largest single area of women's employment: 36%. But the authors were cautious in their estimates of possible job losses in this large and complex area. They referred to forecasts of substantial reductions in employment, but pointed out that these had not yet been achieved. These included the following:

- the Siemens Report (Germany, 1978); this originally envisaged 40% of office jobs being lost through computerisation by 1990, but these estimates were later revised to 25%;
- Jenkins and Sherman (1979) estimated "30% displacement" in information processing jobs by 1990;
- reports by Hyman (1980) and Metra International (1980) both estimated long-term job loss in secretarial, clerical and typing work at 60-70%.

Some researchers have identified both the low rate of investment in the UK, and the high cost of telecommunications technology, as having contributed to a slower and more uneven expansion of office automation than anticipated in some quarters (SPRU, 1982; Pemberton, 1986). More fundamentally, others have questioned the

technologically-determinist assumptions implicit in both the optimistic and the pessimistic approaches to IT 'impacts'. (Williams, 1990; and see discussion in the final section of Chapter Two). From differing perspectives, researchers have identified difficulties in processes of office systems development and implementation, arising from an over-emphasis on 'technical' details at the expense of addressing social and organisational issues, including the complex and informal aspects of clerical work (Glenn and Feldberg, 1979; Hirschheim, 1985; Murray, 1986). Hirschheim (1985) has pointed out how hard it has proved to quantify any productivity increases achieved with office automation, even within the reasonably well-defined area of word-processing. The introduction of word-processing does enable documents to be produced fast; however, it appears to have been accompanied by rising expectations and rising workloads, as authors of documents take advantage of perceived opportunities for easy revisions and redrafts (this is discussed in a case-study context in Chapter Six).

Finally, both the SPRU report and more recent research have indicated that technical advances and falling hardware costs are putting integrated information systems within the reach of an increasing number of organisations. This has been evident in all the case-studies carried out through the Sheffield Human-Centred Office Systems project: in banking, in local authority departments, and in a major engineering company. (Murray, 1987; Green, Owen

and Pain, forthcoming; and see chapters Six to Nine). But these developments offer a range of possibilities, rather than predetermined outcomes. Recent surveys have emphasised the relatively complex and mixed experiences reported by women clerical workers using information technology. For instance, these include both increased job satisfaction and increased stress and health problems; there are references to new skills acquired, as well as to previous skills lost or marginalised (Wagner, 1987; Liff, 1990a). In terms of overall employment levels, the picture is equally complex. Rather than the visible and dramatic job losses predicted by early observers, office information technology has been used to support 'jobless' growth or expansion in some contexts. One report, for instance, estimates that a doubling of staff would have been required to administer the Irish sickness benefits system, had not computerisation been introduced (European Foundation for the Improvement of Living and Working Conditions, 1986). There have been many indications, however, of the uneven and unpredictable course of large-scale processes of office computerisation. To take a prominent recent example, a 1991 report from the National Audit Office described a series of software developments within the UK Ministry of Defence as follows:

"... [the] report admits [one] project [to improve financial planning] suffered successive delays, and had been estimated to cost only 5 million and to be in use by May 1986.... In 1990 trials of software delivered revealed

the system would break down. It was cancelled after spending 10 million. Other failures include a 149 million Crisp computer system for the Royal Navy's stores, which required 6,600 system changes; a 37 million ship stocktaking computer system 18 months behind schedule which provided only half the clerical saving promised..."

('Ministry of Defence: Support Information Technology'. Report by the Comptroller and Auditor General. HMSO, 1991, quoted in the Guardian, 9.8.91).

On preliminary inspection, then, the issue of employment levels, in relation to office information technology, appears to be a more complex one than envisaged in both the optimistic and the pessimistic forecasts of the 1970s and early 1980s. While a certain amount of 'jobless growth' appears to have taken place, facilitated by information technology, there are also instances of major systems failures and inadequacies, leading to increased costs rather than to savings. Examples such as the NAO report quoted above indicate the technical and organisational complexity of large-scale processes of office information systems development and implementation. The issues of systems failures and inadequacies are discussed in more depth in Chapters Three and Four, with specific reference to information systems planning and design.

I now turn to the second theme addressed in research on IT 'impacts': the questions of skill and control in the

office labour process.

1.2: Skill and Control in the Labour Process

The questions of technological change, job loss and deskilling were raised, of course, long before the advent of information technology:

"The instrument of labour strikes down the labourer", wrote Marx in Capital Volume I, going on to quote Nasmyth, the inventor of the steam hammer:

"What every mechanical workman has now to do, and what every boy can do, is not to work himself, but to superintend the beautiful labour of the machine. The whole class of workmen that depend exclusively on their skill, is now done away with... Thanks to these new mechanical combinations, I have reduced the number of grown-up men from 1,500 to 750. The result was a considerable increase in my profits."

(Quoted in Mackenzie and Wajcman, 1985, p.80).

During the postwar 'boom' of the 1960s, a number of social theorists suggested that industrial automation, and the more widespread development and use of computer technology, would lead to a 'post-industrial society'. Much semi-skilled or unskilled manual work would decline or disappear; instead, more interesting and rewarding professional and technical jobs would emerge. Notions of class divisions and class conflict, based on the identification of a substantial working-class, would be

superseded (Bell, 1973; Blauner, 1964; Kerr et al, 1961).

It was Braverman (1974) who became a particularly prominent critic of these views, reasserting a position based on Marxist analysis of class relations and of the labour process in capitalist society:

"The mass of humanity is subjected to the labour process for the purposes of those who control it, rather than for any general purposes of 'humanity' as such... Machinery comes into the world not as the servant of 'humanity', but as the instrument of those to whom the accumulation of capital gives the ownership of the machines."

(Braverman op.cit., p. 192-3).

Braverman explored the specific role of technological change in developments in the organisation of work and in the nature of the labour process. His main arguments may be summarised as follows:

(i) Within capitalism, the need of owners or managers to ensure profitability requires them to retain effective control over workers. Technology and management science are deployed to this end: conception of work is separated from its execution; tasks are fragmented and skills marginalised or lost, in the move to speed up work and make workers interchangeable.

(ii) Social theorists have tended to ignore these tendencies, or to mask them by using occupational or skill classifications which are not closely related to actual

tasks or labour processes;

(iii) There is an increasing convergence between the conditions of factory work and office work, as the latter is subjected to a minute division of labour, to tight measurement, mechanisation and loss of status (at the lower levels). This is seen as part of a broader process of increasing homogenisation, within a class of wage workers who may be employed in factory, shop or office, but who have in common the increasing degradation of their work.

(iv) Distinct sections continue to exist within the labour force, however. In this context, women are seen as confined largely to low-paid, low-status jobs, and as having formed part of the 'reserve army' of labour for capital.

Braverman's work stimulated over a decade of debate, encompassing many detailed studies, including the volumes of papers produced from the annual UMIST/Aston Conferences on the Labour Process (Knights et al, 1985; Knights and Willmott, 1986a, 1986b, 1987, 1990). His argument that within capitalism, technological change will tend to be associated with the deskilling and degradation of work, has also been part of the stimulus for human-centred computer systems design initiatives. (Cooley, 1980; Ehn, 1988; Gill, 1990; Greenbaum, 1987).

Within the now substantial labour process literature, some research has confirmed the existence of a deskilling

trend, while questioning certain aspects of Braverman's methods and general conclusions. Other studies have raised major questions about Braverman's analyses, and about labour process theory in general. Both these areas are relevant to detailed consideration of the scope for Human-Centred systems development initiatives in the office context. Evidence of widespread and continuing deskilling in office work, for instance, might indicate that little basis exists for Human-Centred systems design initiatives, since these implicitly assume a basis of workers' skill and knowledge upon which to build. Indeed, prominent human-centred systems research projects to date have taken place precisely in collaboration with groups of workers whose craft skills and status echo the ideal implicit in Braverman's work (see below). By implication, women clerical workers have not been perceived as sufficiently skilled or organised to make appropriate partners in such projects. On the other hand, should Taylorist management strategies prove not to be the only or the dominant ones, in connection with office information technology, then more favourable conditions may be seen to exist for such initiatives.

1.2.1: Confirmation of the deskilling trend:

Among those who have found evidence of deskilling in clerical work are Glenn and Feldberg (1979), Barker and Downing (1980), West (1982), Crompton and Reid (1982), and Crompton and Jones (1984).

Glenn and Feldberg described a pattern of increasing subdivision and specialisation, as clerical work has lost much of the status associated with the nineteenth century male clerk, and has become a substantial but low-paid area of women's employment. Like Braverman, they refuted claims made by Rico (1967), Shephard (1972) and others, to the effect that automation would bring about the reintegration of tasks previously fragmented by mechanisation. Instead, Glenn and Feldberg saw new office technology facilitating increased fragmentation of work, tighter managerial control and the proletarianisation of clerical workers. However, they also emphasised the importance of clerical work to the successful functioning of organisations:

"clerical units have been described as the 'arteries through which the life blood flows'"

(op.cit., p.72).

They therefore expected deskilling to threaten both productivity and efficiency:

"The paradox is that as managers gain greater control over clerical activities, they may become less able to manage their organisations."

(op.cit., p.72).

Barker and Downing (op.cit.) described the 'traditional' office as one in which women clerical workers are controlled in gender-specific ways: for instance by the pressure from managers for them to dress appropriately, and act as 'office wife'. However, they also viewed

informal work culture as including indirect forms of resistance, by women, to managerial control. Barker and Downing saw Taylorist techniques as undermining these gender-related patterns of control and resistance. In particular, information technology - initially in the form of word-processing - was seen as heralding a major trend towards deskilling, fragmentation and tighter managerial control:

"... a form of control which embodies the social relations of men's dominance and women's subordination is being replaced by a technology which isn't 'neutral', but embodies the social relations of capital's dominance over labour."

(op.cit., p.163).

Like Huws, Barker and Downing saw the introduction of information technology as part of the continued reorganisation of the labour process by capital, with the aim of increasing productivity and sustaining capital accumulation. They acknowledged the need to relate theories of class to theories of patriarchy - an area to which I will return in Chapter Two. Regarding deskilling itself, Barker and Downing argued that 'conventional' notions of skill could not be applied straightforwardly to work carried out predominantly by women. Here they referred both to the ways in which 'women's work' has been defined and devalued historically, and to the 'apprenticeship in womanhood' through which secretarial workers acquire a range of social and organisational

skills. However, Barker and Downing did not dwell on these points; and in identifying a shift away from patriarchal forms of control in the office, and towards more direct forms mediated through office technology, they did not perceive the tensions or the paradoxes suggested by Glenn and Feldberg.

West (1982) found that with word-processing, old skills are lost, notably the typist's skill in producing perfect copy. Criticising those who claimed that new jobs or new skills would emerge, she pointed to the lack of evidence for any broadening of wordprocessor operators' tasks and responsibilities, and to the obstacles (including the requirement for formal qualifications) standing in the way of clerical workers' access to jobs in administration or computing. West agreed that secretaries may experience the greater task variety and responsibility suggested by researchers such as Bird (op.cit.), but found no indication that these changes would include improved status, pay or recognition. In terms of clerical work in general, West commented that fragmentation and lack of career opportunities are not new for women in areas such as banking; however, technological change could provide an opportunity for these trends to be intensified. However, she distinguished between these contexts and those, like local government, where many clerical jobs include elements both of contact with the public and of administrative processes (c.f. Crompton and Jones, 1984; Davies and Rosser, 1985).

Confirmation of the links between computerisation and deskilling may also be found in research by Crompton and Reid (1982) and Crompton and Jones (1984). Here, the discussions of skill are particularly comprehensive. Crompton and Jones retained a 'task-centred' approach to skill, in common with Braverman; and like Rosenbrock (1981), regarded the dimension of control as essential to definitions of skill. (That is, a person's control over his or her own labour-power, and over other resources, including the labour-power of other people). Accordingly, they used a detailed system for coding jobs on the basis of content, complexity, discretion and supervision. They concluded:

"... the vast majority of the clerical and administrative employees we interviewed were in jobs that required them to exercise little in the way of skill; work tasks were on the whole governed by explicit rules, and few could exercise discretion or self-control in their work."

(Crompton and Jones, op.cit., p.64).

These patterns were seen as applying to many administrative and supervisory posts, as well as to basic clerical grades, and in general Crompton and Jones found that where levels of mechanisation were highest, the work of the lower clerical grades was most likely to be rated as unskilled or semi-skilled (in terms of the work-description codes adopted in their study).

Like West and Barker and Downing, Crompton and Jones also commented on the ambiguity of the term 'skill' itself. Strongly-organised workers may succeed in retaining skilled status, despite a degree of deskilling in the procedures carried out; in contrast, the skills typically exercised by women are commonly overlooked or undervalued. Exploring these latter points further, Crompton and Jones illustrated the ways in which many women clerical workers actually develop skills and responsibilities which go far beyond their formal job descriptions, and demonstrate a connection with experience of family life and of the 'apprenticeship in womanhood' described by Barker and Downing. (Supervision of a mentally handicapped trainee in the office, and dealing with enquiries from recently-bereaved people are two such examples). Crompton and Jones also speculated that since skills defined as 'social' rather than 'technical' have proved hard to measure, these may also be less susceptible to deskilling processes. However, they add that "our research stopped at the office door", thus preventing further exploration of the relationship between domestic experience and workplace experience. I return to this point below, in sections 1.2.2 and 1.2.3.

The research just summarised has, therefore, provided some support for Braverman's deskilling thesis. But while Crompton and Jones found many areas of office work to be deskilled to varying degrees, they rejected Braverman's conclusion that 'an immense mass of wage workers' was

thereby being created. Instead they concluded firstly, that deskilling is only one of a number of capitalist or managerial strategies for controlling the labour force (fragmentation, rather than homogenisation, being another - c.f. Gordon, Edwards and Reich, 1982). Secondly, they theorised the class structure as a system of 'empty class places', requiring careful analysis in connection with specific labour processes and worker characteristics. Here, gender divisions were seen as particularly important. Crompton and Jones concluded that male office workers have been protected to some degree from the consequences of deskilling and routinisation, because of the feminisation of the lower grades of clerical work:

"... in a very real sense, men need women in the office... the male career rests on the continuing subordination of non-manual females."

(op.cit., p.243).

However, they did not regard this situation as entirely stable. They commented that sustained efforts, by even a small proportion of women clerical workers, to gain improved training and career opportunities could have a significant impact on male career patterns, in a context of little or no expansion in office work. They concluded that the deskilling, routinisation and fragmentation they had observed in non-manual work represented trends that would not be reversed, and that the 'office proletariat' of the future was likely to include an increasing proportion of men as well as women.

The research summarised above shows, then, that some areas of clerical work are characterised by routine tasks, with little scope for the exercise of discretion or control. However, it also shows firstly, that this is a very uneven and complex picture: significant areas of clerical work, for instance in parts of the public sector, include important elements of both tacit and social skills, which are intrinsically hard to measure and record, whether for systems analysis or for other purposes (Polanyi, 1967; Olerup et al, 1985; Ehn, 1988). Contact with members of the public, and with a range of colleagues, makes clerical work in a council housing department office far more complex than word-processing in a large building society branch or insurance company office. However, word-processing itself also requires more skill and training than assumed by many managers or systems analysts (see Chapter Six, and Liff, 1990a). Secondly, processes of fragmentation and deskilling in office work cannot be simplistically attributed to the effects of information technology. Recent research points instead to an interaction between technological and organisational processes: Webster, for example, has described the ways in which word-processing applications have been shaped, adapted and often greatly under-used within offices whose patterns of work organisation ranged from Taylorist models to traditional ones, all of which predated computerisation. (Webster, 1990; Fleck, Webster and Williams, 1990; discussed in greater detail in Chapter Two). Existing literature would suggest, therefore, that

clerical deskilling has not reached levels which would preclude the investigation of scope for human-centred systems design initiatives. However, important and related points have also been made within a broader critical discussion of Braverman's work and of labour process theory in general, and I move on to these in the following section.

1.2.2: Braverman and Labour Process Theory:

Critical Responses:

Critical responses to Braverman's analyses of technology and the labour process have highlighted three areas as being particularly problematic. All bear on the question of human-centred systems research in the context of office work, since they concern the relative power of, and the interactions between, managers and men and women in the office workforce. These areas are the following:

- (i) An over-emphasis both on managerial unity, purpose and coherence, and a corresponding underestimation of workers' formal or informal resistance;
- (ii) A simplistic conception of skill;
- (iii) An inadequate theorisation of gender divisions.

These are discussed in turn below.

(i) Managerial Purpose, Worker Passivity?

Like Crompton and Jones (op.cit.), Manwaring and Wood have

identified Braverman's tendency to assume that Tayloristic management practices are unproblematic to implement. Citing Volvo's initiatives to form autonomous work groups as one example, they illustrated both the economic limitations of an extreme fragmentation of tasks, and the existence of other possible strategies, both for managements and for trades unions.

(Manwaring and Wood, 1985).

Friedman (1977, 1978) and Edwards (1979) have both linked the limitations of Taylorist management approaches to the importance of workers' organised opposition. They have argued that on occasion, this opposition has obliged managers to adopt alternative strategies, in order to retain overall control (Here, Edwards cited both the development of complex industrial relations procedures, and the fostering of divisive internal labour markets, as examples). From this perspective, Braverman's account is seen as assigning far too passive a role to workers in organisations. (This is discussed again in relation to concepts of skill, in section (ii) below).

Taking up these points, Elger (1982) argued for a historically located theorisation of the transformation of the capitalist labour process. Within such a historically-specific approach, deskilling would be seen as a tendency - occurring unevenly, and meeting varied responses - rather than as an undifferentiated law or impulse. To illustrate this argument, Elger compared Braverman's work with Huw Beynon's research at Fords

(1973), and with Beynon and Nichols' research at ICI (1979). Here, the complex and contradictory aspects of "'deskilled' collective labour" are explored, including the limited scope available to workers in car and chemical plants to gain a degree of autonomy from close supervision, and to sustain the claim to 'skilled' status in order to gain or to retain concomitant wages and working conditions. (c.f. Cockburn, 1983, discussed below). Nevertheless, Elger does not dismiss the importance of Braverman's work in focussing political and academic attention on changes in the labour process within capitalism.

The area of managerial strategies has been discussed in some detail by Friedman (1989). In surveys of managerial strategies and practices related to information systems development, Friedman identified a continuum of approaches, ranging from an authoritarian extreme (the 'direct control' model) to one fostering flexibility, individual effort and loyalty to the organisation (the 'responsible autonomy' model). As Friedman points out, these patterns have been observed before: McGregor (1960) distinguished between 'theory X and theory Y', and Burns and Stalker (1961) contrasted 'mechanistic' and 'organic' styles of management. Braverman can be criticised for over-emphasising the prevalence of 'direct control' strategies, which have tended to find favour where the emphasis is on minimising labour costs in the short-term, but which undermine an organisation's ability to respond to changing circumstances, and to retain staff. (Friedman

op.cit., pp 50-53). A careful identification of prevailing management strategies is specifically relevant to the area of information systems development, where Friedman and his colleagues have suggested that the increasing prominence of user relations issues poses particular problems for the 'direct control' forms of management. (Friedman and Cornford, op.cit.). This theme is discussed further in Chapters Three and Four, and in Chapters Six to Nine.

(ii) A Simplistic Concept of Skill?

Heather Rolfe (1986) has provided a comprehensive summary of the problems raised in relation to the concept of skill, since the publication of Braverman's work. While Braverman and other social theorists have rejected analyses of skill which focus solely on psychological attributes, or which see it as 'human capital', Braverman himself did not formulate an explicit, alternative model. His analysis implied a model based on pre-industrial craft work, emphasising both unity of conception and execution, and the worker's control over tools, labour and the tasks undertaken. But this implicit definition poses problems of its own: the questionable relevance of a 'craft' model within an industrial context; the very general ways in which terms such as conception, execution and control are used in Braverman's work; some confusion about the relationship between skill and control; and a failure to acknowledge the ways in which skills have been defined and recognised (or marginalised) through workplace conflicts

and broader political processes, including the challenging and the reproduction of gender divisions.

Rolfe herself acknowledged the importance of the ways in which skill has been socially constructed, as illustrated by Blackburn and Mann (1979), Cockburn (1983) and others. Like them, however, she was also concerned to retain a detailed focus on actual work processes, and on the precise ways in which certain activities come to be seen as skilled. Like Manwaring and Wood (1985), Rolfe emphasised the importance of tacit skills (Goranzon, 1982; Polanyi, 1967). She also suggested that since 'social' skills are often essential for effective work (for instance a doctor's 'bedside manner'), the common distinction between 'social' and 'technical' skill may be misleading; and in contrast with Crompton and Jones, she argued that "while skill may lead to control, or control lead to skill, they are not ... synonymous". Rolfe concluded:

When one looks at work of different types, it becomes apparent that skill as a singular entity does not exist, and that it is often necessary to vary the criteria which one uses to assess it. Appropriate criteria therefore depend on the nature of the work, but include discretion, task range, technique, control over resources, control over work methods, autonomy and knowledge."

(Rolfe, op.cit., p.41).

Applying these criteria in an insurance office case-study, Rolfe did in fact find a picture similar to that described by West (1982) and Crompton and Jones (1984). Task

variety was being reduced, while pace and pressure of work increased; job loss and polarisation between levels of work were also evident. Rolfe saw deskilling taking place both as a result of computerisation, and as part of a long-term trend towards standardisation. In this context, she also saw deskilling processes as dependent upon the established and continuing 'feminisation' of routine clerical work, and upon a reinforced gender division of labour, within which women occupy the lowest grades.

Rolfe's Ordnance Survey office case-study, however, revealed a somewhat different picture. Here, digitised mapping represented a shift away from the tacit skills required for drawing maps by hand; these 'perceptual skills' were replaced by the conceptual ones needed to operate a computerised system. There was a degree of fragmentation, since individuals no longer corrected the maps they had drawn; however, discretion and task range remained significant. Greater polarisation of skills, and more rigid gender divisions, appeared to be emerging, with some manual tasks being relegated to women on low-paid 'assistant' grades. But new systems also appeared to offer opportunities for other professional boundaries to be blurred, for instance by enabling surveyors to take part in the draughting process.

One salient point about the studies of skill and deskilling referred to so far is that their workplace emphasis (consistent with the labour process perspective) prevents them from going 'beyond the factory gate' in

Crompton and Jones' phrase. The focus has been on actual or potential changes in skills within particular jobs, usually without relating these to the perceptions, assessments and skills which workers themselves bring to their jobs. (c.f. Burawoy 1979). To varying degrees, this has tended to compound the neglect of workers' own responses and forms of resistance already referred to in (i) above. Alternative perspectives have been put forward, however, attempting to avoid this narrowing of focus; Kusterer (1978) and Cockburn (1983) have provided two examples.

Kusterer found that skill is usually understood as a combination of know-how and manual dexterity. Rejecting this definition as too narrow, and biased towards manual or craft activities, he preferred the term "working knowledge". In his view, this term could be used to reflect the accumulated experience which makes it possible to carry out routine tasks accurately and at great speed; it could also reflect workers' wider awareness about a workplace and a set of labour processes. On this basis, Kusterer concluded that:

"There is no such thing as unskilled work. The term demeans the workers involved, and it misleads all who seek to understand the nature of their work."

(Kusterer, op. cit., p.121).

Kusterer viewed working knowledge as important in two respects. Firstly, he saw it as part of a relationship between workers and management that is ambivalent and

contradictory; management both depends on workers' detailed knowledge, and seeks to limit it in order to maximise control (c.f. Glenn and Feldberg, 1979; Murray, 1986; Burawoy, op.cit.).

Secondly, the development of working knowledge can also represent individual attempts to resist alienation, and to achieve a degree of fragile, day-to-day control. This illustrates the possibility of collective change, while not guaranteeing any progress towards it:

"to note that working knowledge is a source of workers' control is to raise the possibility and plausibility of instituting that control, of creating real worker self-management, but it is not to suggest that workers' emancipation has somehow secretly occurred."

(Kusterer, op. cit., p.121)

Commenting on this approach, Manwaring and Wood (op.cit.) concluded that:

"working knowledge does not in and of itself refute the deskilling thesis, but it does provide a different vantage-point, one in which the central notion is that work is both degrading and constructive, both crippling and enriching."

Manwaring and Wood considered that Kusterer had over-emphasised the degree of autonomy or control (even transient) to which working knowledge may contribute.

However, they supported his emphasis on tacit skills, particularly in relation to the ways in which experience of work is connected with class consciousness or political awareness. Citing the example of low-paid Black and women workers, they also argued that management's genuine dependence on workers' tacit and articulated skills is not always reflected in pay or status. Acknowledging the role of race and gender in relation to workers' bargaining-power, they too pointed to the need to extend research 'beyond the factory gate'.

This acknowledgement of complex interactions between class, race and gender relations is welcome. However, in the form expressed here, it is also one instance of a general weakness which has been identified in labour process theory: that is, the tendency to locate class relations within the workplace, but to see race and gender relations as being reproduced primarily outside it - that is, through education, for instance, or in the family.

Cynthia Cockburn (1983, 1985, 1986) has explicitly addressed these issues, both with respect to concepts of skill, and with respect to the theorisation of class and gender. Like many of the researchers referred to above, she is careful to distinguish between deskilling, loss of control and degradation: for example, the printers in her 1983 study had experienced some deskilling in terms of the tasks carried out, but retained considerable strength and bargaining power through their union, which had enabled them to resist degradation in the areas of pay and

conditions. However, they had experienced a clear loss of social status in their own eyes.

A particular feature of Cockburn's approach has been to clarify the concept of skill by identifying three distinct aspects: firstly, Cockburn saw the 'total ability' in each man, increasing with experience; secondly, the skill required by the job, which may or may not match that in the man; and thirdly, skill in the politically-defined sense, arrived at through bargaining. This last sense of the term has both a class aspect and a sex/gender one. Here Cockburn chose to take the step referred to above, 'beyond the factory gate'; in her long and intensive interviews, she deliberately focussed on the relationships developed by printers outside as well as within work. In this way, she was able to illustrate the conflicts and the contradictions the printers faced, in the context of technological change. For example, as 'skill in the job' shifts towards unfamiliar and despised keyboard skills, usually associated with women's work, will a compositor be able both to retain his sense of his own accumulated skill, and also question his previous assumptions about women's office skills and women's status? Can a basis for solidarity between men and women in the newspaper industry be constructed across gender and status lines, to protect the long-term interests of all?

The scope of Cockburn's research goes beyond issues of skill and gender, and encompasses theoretical analyses of the ways in which gender divisions are reproduced in

relation to technology. I refer to this broader picture again in section (iii) below, before discussing it in detail in Chapter Two.

For the moment, we can observe considerable refinement and development, in relation to concepts of skill, since the initiation of the labour process debate in the mid-1970s. While there may not be one single, unanimous view of the 'skill' concept in use, there has been an acknowledgement of complexity which perhaps parallels a similar acknowledgement with respect to the analyses of managerial positions referred to in (i) above. As Knights and Willmott have pointed out (1990), to some degree these points belong to a "level of fine-grained detail" which it was never within the scope or intentions of "Labour and Monopoly Capital" to address. There is evidence of deskilling, in certain contexts. However, Crompton and Jones alert us both to the limitations of Braverman's broader conclusions concerning class structure, and to the importance of acknowledging the impact of gender divisions on processes of deskilling and proletarianisation.

Moving from skill and deskilling issues as they relate to issues of class structure to the level of specific jobs and workplaces, Rolfe has underlined the need for sensitivity to particular workplace contexts. Both Kusterer and Cockburn have brought back into the picture the importance of the skills and the knowledge which people bring to their jobs, even where these are

necessarily manifest in the form of resistance to inflexible and unrewarding working conditions. Cockburn's research has been distinctive because her investigation of issues of skill and technology in the labour process has also integrated a detailed analysis of the ways in which gender relations shape jobs and workplaces, both for men and for women.

The skill issue itself has been one of the main themes in discussions of labour process theory from gender perspectives. This is therefore a natural point at which to move on to this third set of issues, beginning with a review of the ways in which skill and deskilling have been discussed in connection with gender, and then moving on to address some of the broader issues which have been raised.

iii) Gender Issues in Relation to Labour Process Theory

Critical consideration of gender issues in relation to skill was initiated in part by Phillips' and Taylor's article "Sex and Skill", first published in 1980 (reprinted in Feminist Review, 1986). They noted that men were generally employed in jobs where the workforce was at least 90% male, whereas women tended to be employed in jobs where at least 70% of the workforce was female. Broadly, their view was that deskilling and degradation were taking place, both in manufacturing and in clerical work. However, they found that examples of skill classifications illustrated clearly the impact of gender divisions. In clerical work, for example:

"it was not that men's jobs were deskilled and women drawn into them, but that a new category of work was created which was classified as 'inferior'... by virtue of the status of the women who came to perform it."

(Phillips and Taylor, op. cit., p.61).

In clothing manufacture, Phillips and Taylor found that:

"the identification of men with skilled and women with semi-skilled or unskilled status has been generated through the struggles of men workers to retain their dominance within the sexual hierarchy... craft status was identified with manhood."

(op.cit., p.62).

Here the pressure were especially acute and complex, since many of the men involved were Eastern Europeans whose 'immigrant' status excluded them from many other forms of employment.

Phillips and Taylor concluded that *"skill has increasingly been defined against women"* (op.cit.p.63). However, they saw this process as creating conflicts and contradictions for men as well as for women - exposing men, for instance, to competition from women's cheaper labour. In conclusion, they argued for a re-thinking of economic categories, and for a rejection of *"the ideology of masculine skills"*, in their interests of aiming for more satisfying work both for women and for men.

While they successfully exposed the gender-related features of the ways in which skill is socially-

constructed, these arguments did not dwell on any detailed analysis of the low-status jobs in which women tend to be concentrated. Other researchers have since argued for a more careful analysis of the jobs women do, suggesting that *"the problem for women is not in their skills, but in the way these skills are rewarded"*. (Gaskell, 1987, p.362). Gaskell criticises Phillips and Taylor for relying on categories such as training time to differentiate among skill levels. She points out that time is a useful measure for social scientists, *"as it can be turned into a number and used to compare things that are actually quite unlike."* (op.cit., p.365). In this sense her argument is similar to Rolfe's, emphasising the need for sensitivity to wpecific work situations. Gaskell provides comparative accounts of the history of training in craft trades and in clerical work in order to make a number of points.

Firstly, education or training do not always impart specific, discrete skills, so much as the attitudes and behaviour considered appropriate by an employer (c.f. Rolfe, op.cit.). Secondly, education itself can be an area of struggle and conflict; here Gaskell illustrates her point with reference to the struggle of Canadian miners to retain apprenticeship schemes. But thirdly, while male craft workers successfully established apprenticeships as one way of controlling entry to a trade and protecting its 'skilled' status, this was never the case in clerical work. Clerical skills - including very

specific and technical aspects, such as shorthand and typing - soon became part of school and college curricula. In addition:

"clerical skills became part of every woman's skills, along with the ability to manage her personal appearance, support the men around her and handle interpersonal relations. The training does not appear scarce, long and arduous, but easy, taken for granted (as long as you are female) and thus no skill at all."

(Gaskell, op.cit., p.376).

Gaskell's arguments make a useful contribution to debates on skill, gender and the labour process in two senses. Firstly, they confirm and extend other research which has pointed to the ways in which work and skills associated with women tend to be underestimated, or simply rendered invisible as 'natural' feminine attributes. Gaskell signals the importance of not allowing 'women's work' to be equated automatically with low-skilled work, whether in conventional assumptions or in more critical accounts. Secondly, Gaskell signals the ways in which campaigns to gain access for women to previously male-dominated areas of work may implicitly reinforce precisely this gendered view of women's labour. She highlights, then, the need to combine working for new opportunities for women with working for much greater recognition for those areas in which women are already concentrated, such as office work or childcare. However, achieving a good balance between these two directions in practice has proved a contentious

and difficult process; this has been particularly apparent in relation to research and to practical initiatives in the area of women and technology, and I discuss this again in Chapter Two.

West (1990) provides a comprehensive summary regarding gender and skill in the labour process. As well as discussing a number of the points already raised above, she identifies the complex ways in which gender and class relations may be seen to interact, at the workplace level, reproducing gendered skill definitions and pay and grading patterns. Emphasising the variations which can emerge in different settings, West points to evidence which highlights women's concentration in labour-intensive rather than capital-intensive work. Milkman for instance has described the different 'control regimes' associated with each of these - that is, an emphasis on cheap labour in connection with the former, and on *"high-wage strategies combined with gender ideology and sex-typing"* in connection with the latter (Milkman, 1983, pp.171-6, quoted in West, op. cit., p. 252). It has also been suggested (Liff, 1986) that an important distinction can be made between newly-mechanised areas, into which women can be drawn without challenging gendered skill definitions or pay differentials, and areas in which men perceive their established skilled status and technical competences as potentially under threat from women entrants.

Moving beyond the specific issue of skill, and taking a

broader overview of labour process discussions of gender, I suggest that two main, diverging directions are evident. Both really require that the terms of debate be extended beyond the confines of labour process theory in its earlier forms. Firstly, a number of researchers have challenged Braverman's own emphasis on factors extrinsic to the workplace in explaining gender divisions. Beechey, for example, has pointed out both his tendency to present an idealised image of the family, and the weaknesses inherent in early labour process characterisations of women as a 'reserve army of labour' within capitalist societies. (Beechey, 1987). Both approaches take women's subordination as a given to some degree, failing to recognise the ways in which men can benefit from and actively contribute to perpetuating gender inequality. (Davies and Rosser, 1986). A number of contributions to labour process research have begun to take up these points, by analysing the ways in which gender divisions are reproduced within the workplace itself, rather than arising solely from the constraints of domestic labour or patriarchal ideologies. (Cockburn, op.cit; Davies and Rosser, 1986; Knights and Willmott, 1990; Knights, 1990).

Taking a detailed example in the area of clerical work, Davies and Rosser studied clerical labour within the British National Health Service. They found that formal distinctions between clerical grades (predominantly female) and administrative ones (predominantly male) broke down when detailed comparisons were made, and they

also identified the "Female Office Managment Function". This was a function which they regarded as having become an essential but unacknowledged part of many low-paid clerical jobs, and which drew implicitly on skills - notably social and organisational skills - developed by women in the course of personal and family life. Developing this analysis further, they proposed the concept of of a 'gendered job':

"A gendered job was one which capitalised on the qualities and capabilities a woman had gained by virtue of having lived her life as a woman... On this model, gender is not an 'additional lever' or a convenient additional resource for control - it has become built into the labour process itself."

(Davies and Rosser, op.cit., p. 103).

Explicitly, then, men's jobs too may be seen as gendered - in the ways analysed most prominently in Cockburn's work. (Cockburn, 1983, 1985). Like Crompton and Jones (1984), Davies and Rosser did not view the situation they described as a static one:

"The gendered jobs which had gone unquestioned in an era of more clear-cut male administrative and female clerical work may thus become a problem, precisely because of the interaction of changing family forms and the labour market."

(Davies and Rosser, op.cit., p. 109).

Researchers such as Davies and Rosser, then, share with Cockburn and others (e.g. Pringle, 1988) the view that

further analyses are needed of the ways in which gender relations are actively reproduced within the workplace. (They also retain a commitment to tracing the connections between the workplace, the household and the labour market). Their focus is on the ways in which class and gender relations interconnect, and - in contrast with most contributors to labour process literature - class and gender are seen as equally significant.

Within a somewhat different perspective, Knights and Willmott share this commitment to analysing the reproduction of relations of power and inequality within the workplace. (Knights and Willmott, 1986, 1990). In their 1986 article, they develop a critique of the tendency towards a mechanical 'Marxist functionalism' in some areas of labour process analysis, over-emphasising structural constraints at the expense of human agency. They also present their own case-study account of labour processes within insurance offices. In this context, they find gender inequalities to be entrenched; office managers tend to define suitable candidates for promotion in terms which implicitly exclude women; the women in the office, in turn, adapt or resign themselves to the situation. In Knights' and Willmott's view, a preoccupation with personal security and identity tends to preclude moves towards any form of collective action (by the women) which might improve their situation.

Although Knights and Willmott themselves claim not to be

'blaming the victim' here, it might plausibly be suggested that the insurance office context they describe does not appear to offer particularly fertile ground for collective action in favour of equal opportunities. In many other contexts - the National Health Service provides a recent example - women workers have successfully pursued collective strategies to improve pay and employment opportunities. That is, the attitudes and responses among women in the insurance office described by Knights and Willmott may well have reflected a reasonably accurate assessment of the obstacles they faced, rather than simply an escape into personal preoccupations.

In their 1990 edited volume, Knights and Willmott consolidate their earlier critiques of labour process literature, and move towards a theoretical framework less susceptible to the above criticism. Here, they identify a failure to theorise 'the subject' adequately as fundamental to the mechanistic or functionalist tendencies they had referred to in earlier discussions, in connection both with gender and with areas such as management strategies: "... a failure to examine subjectivity in the same rigorous and critical fashion as political economy." (Knights, 1990, p. 306). In his own detailed chapter, Knights attributes this failure to:

"the major weakness of Marxism - the failure to develop a non-essentialist conception of subjectivity... Consequently, labour process theory has been inclined to a view - albeit not always articulated - of subjectivity as

representing the productive and autonomous aspects of human existence, which are to be contrasted with the objective structures that constrain them... this dualism between the creative subject and the constraining object is unhelpful, since it fails to capture the social character of relations, practices and institutions."

(Knights, 1990, pp.302-303).

Knights goes on to discuss two "outstanding" ethnographic studies, within the labour process literature, which do focus upon workers as subjects at an empirical level, and which he views as successfully capturing more of the complexities of social relations referred to above. He focusses firstly on Burawoy's 1979 study, emphasising workers as 'self-organising', and secondly on Cockburn's 1983 study of printers as 'gendered subjects'. He welcomes the ways in which both reflect the complexities of management-labour relations (Burawoy) and of class and gender relations (Cockburn). However, he also finds that both "close off" opportunities for analyses of power and subjectivity, by describing workers' shopfloor strategies simply as 'compensation' for a wider lack of power and satisfaction. (Knights, op.cit., p. 310-317). In Knights' view, this does not do justice to the complexity of the ethnographic data itself; his own preference is to adopt a concept of power which - drawing on Foucault - views it as both constraining and enabling.

This framework does have the potential to avoid characterising workers as passive, or as victims, in

contrast with the 1986 case-study referred to above. It remains compatible with Cockburn's commitment to analyses of both men and women as 'gendered subjects'. However, it may be objected that - in contrast with Cockburn, in particular - the resulting analyses may present a rather static picture, failing to identify pressures or initiatives for change. I return to this theme in Chapter Two, in connection with other research concerning gender and technology.

The second theme or trend in recent labour process literature concerning gender, which I want to suggest is somewhat at variance with the studies just described, is most comprehensively represented by Jackie West (1990). West acknowledges the ways in which both Davies and Rosser and Cockburn have advanced labour process approaches by analysing the ways in which gender is integral to the labour process (West, op. cit., p.253). She also notes that questions still remain about the connections between workplace gender relations and 'extrinsic' factors such as women's domestic labour: in mapping out the ways in which "gender is built into the material fabric of work", both Cockburn and Davies and Rosser still find themselves invoking the importance of the skills and capabilities women bring to work from the household.

Taking Cockburn's work as the most highly-developed analysis of gender relations in the workplace, West's reservations centre upon what she sees as tendencies to play down differences between men, and sometimes to "allow

gender identity to obliterate class position" - for example:

"It is true that most engineers are men, while most shop-floor and office employees are women, but the comparison she draws between the pay and conditions of routine factory and clerical workers on the one hand and those of 'top-flight' or software engineers, working directors or consultants on the other (1985: 158-61) is above all a comparison between those who labour and those who control."

(West, op.cit., p.259).

In my own view, West is underestimating here Cockburn's analyses of the complex ways in which the prevailing 'sex/gender system' includes divisions between both men and women, interwoven with class relations (see for example Cockburn, 1985). Nor does she give more than passing acknowledgement to the extent and significance of what Cockburn terms the male 'tenure' of technology, or to the ways in which men have historically organised to exclude women from particular areas of work.

West's own immediate concerns remain much closer to the mainstream of labour process theory. She documents the enormous significance of women's employment in the economic restructuring processes of the 1970s and 1980s in Britain - particularly in relation to the ways in which employers have sought to establish flexibility through a substantial growth in part-time, subcontracted and casual labour. (West, op. cit., p. 263-266). In her view,

"concern with the role of gender at the point of production has led to a neglect of labour-market issues" (op.cit., p. 266). Taking the capital-labour relation as the fundamental one, West summarises her position as follows:

"... capitalist development is in fact premised on a whole variety of strictly non-class forms of subordination and the real context in which the struggle of labour and capital is played out is a terrain marked by the concrete attributes of gender - or, indeed, race and ethnicity... capital has to negotiate, in its search for an available labour force, with both women's role in reproduction and with patriarchy."

(West, op.cit., p.268-9).

I welcome West's emphasis on the ways in which "women are, as they have often been in the past, in the front line of fundamental changes in the organisation of the labour process" (op.cit., p. 267). It is worth observing that this 'front-line' experience has not led to studies of women workers, or of gender, moving from the margins to the centre of the numerous volumes of papers emerging from the UMIST/Aston Labour Process conferences (the 1986 volume on 'Gender and the Labour Process', despite its value in highlighting gender issues, illustrates the way in which gender has remained a 'special' topic rather than an integral feature of labour process debates).

My reservations arise from the ways in which this

perspective continues to obscure or to marginalise the concerns which researchers such as Cockburn have only quite recently managed to place on the sociological agenda. Cockburn explores the complexities of the ways in which women and men accommodate both the demands and the satisfactions of paid work and life outside work, sometimes 'bucking the system' where they find an opportunity. In West's perspective, the area of reproduction appears as a constraint holding women back from full participation in paid labour or in industrial and political organisation, rather than a complex area in its own right, with positive and negative aspects for women and for men. Part-time work is described in terms of the problems associated with its current forms, such as low pay and lack of security; there is no discussion of the potential it can offer for the working week to be redefined in ways which might challenge the conventional working patterns in which men predominate, so that for instance care of dependents might become recognised as a valid activity rather than a burden or a disqualification. Finally, with the shift away from gender relations at the point of production and back towards labour market patterns, the focus on the ways in which gender inequalities are reproduced - or challenged - becomes harder to sustain.

Conclusion:

In this chapter I have identified two areas in which IT has been understood as producing 'impacts' on office work:

firstly, employment levels and secondly, the issues of skill and control in the labour process. Both are directly relevant to Human-Centred Systems research: either major falls in employment opportunities, or widespread deskilling, could be seen as undermining any substantial basis for such forms of intervention in the context of office work.

Regarding both areas, a review of the literature reveals a more complex picture than the one anticipated in the somewhat deterministic predictions - whether optimistic or pessimistic - of the late 1970s and early 1980s. In terms of employment levels, information technology has certainly been associated both with job losses and with 'jobless growth' in specific instances. However, both rising managerial expectations, and significant problems with systems design and implementation, have also been evident.

In terms of the issues of skill and control in the labour process, I have summarised a range of research which does illustrate processes of deskilling, in office work and elsewhere. However, here the picture is very mixed. Clerical deskilling may present management with the paradox of increased control but decreased organisational flexibility and efficiency (Glenn and Feldberg, 1979; Murray, 1986). Many substantial areas of office work, particularly in the public sector, also display highly-skilled aspects which have historically been taken for granted - and built into the labour process - in a process

in which 'gendered jobs' have evolved. (Crompton and Jones, 1984; Davies and Rosser, 1986; Gaskell, 1987). Most recently, it has been argued that rather than IT promoting deskilling processes, new information systems are themselves significantly shaped by pre-existing forms of work organisation (Webster, 1990).

At a more general level, I have identified a range of weaknesses within the labour process perspective itself which indicate that it does not provide a comprehensive framework in social theory to fully support the kinds of Human-Centred systems research which it originally helped to stimulate. Contributions to labour process literature have significantly refined analyses both of managerial practices and of workers' skills and perceptions. However, these specific areas are also linked to more fundamental concerns, both with the relationship between technological and organisational change, and with the ways in which patterns of both class and gender inequality are reproduced through workplace practices. These themes have been investigated from a range of perspectives within analyses of gender and technology, and it is to this literature that I now turn in Chapter Two.

CHAPTER TWO:

WOMEN AND TECHNOLOGY, GENDER AND TECHNOLOGY.

Introduction:

To date, the most prominent social science perspectives which have stimulated Human-Centred Systems research have addressed issues of class (through labour process theory) rather than gender relations (Cooley, 1987; Ehn, 1988; Gill, 1990). My aim in this chapter is to examine where the starting-points might be in social science, to inform Human-Centred Systems research which can also integrate gender perspectives, in the context of office work. In Chapter One I identified a number of problems with the ways in which gender has been theorised within Labour Process research, especially in relation to class. The second set of issues raised but not discussed in detail in Chapter One concerned theorisations of the relationship between technology and organisation. Both themes have been addressed, to varying degrees, in areas of recent research on gender and technology, including information technology.

What can this literature contribute towards a sound basis for HCS research? In 1989-90, Sonia Liff was commissioned to review recent research related to gender and IT, in order to produce a report for the ESRC-funded Programme on Information and Communications Technologies (PICT) ('Gender and Information Technology: Current Research Priorities, Strengths, Gaps and Opportunities', Liff, 1990). The report notes the large and expanding body of

social science research on IT, but finds that gender issues have largely been marginalised, even within categories - such as research into IT use in households - within which they might have been expected to become prominent. Commenting on a substantial review of IT-related research between 1980 and 1989 (Whitaker, 1989), Liff states:

"It appears that the more divorced research is from actual groups of people, either because the work is technical or because it involves rather abstract analysis or speculation, the less likely gender issues are to be taken up. Thus gender issues are absent from chapters on the technology-organizational issues and from those on social trends and the household and the community..."

(Liff, 1990, p.7).

And, noting the ways in which research into IT has largely been formulated in the language of the public rather than the private domain:

"... it would appear that when broad social trends are being discussed, or technological trends predicted, gender issues fade from view behind collective terms like 'families', 'households', 'citizens' or 'consumers'."

(Liff, op.cit., p.29).

Although the literature on gender and IT remains somewhat underdeveloped, there is a growing body of research examining women's experience of technology at a more

general level, some of which shares a number of its methods and theoretical perspectives with the literature concerning gender and science. This research has included both theoretical analyses and programmes for intervention and change, which form a useful starting-point for specific research into gender and IT. Firstly, there has been research which particularly documents women's under-representation in technology-related work (except at the lower levels), and emphasises the importance of tackling this through equal opportunities policies, training or other practical measures. Secondly, there is research which has begun to broaden the terms of debate by focusing on gender and technology, rather than women and technology. Here, one prominent theme has been the argument that both science and technology would benefit from the influence of women's experience and 'women's values'. In contrast, other streams within feminist research on technology have sought to develop a 'feminist materialist' perspective, suggesting a number of different approaches to the theorisation of class and gender in connection with technology.

These different approaches coexist in current research, rather than representing a finished logical or chronological progression, and all have produced useful results. For example, research within the first category has shown the extent of women's past and continuing under-representation in IT-related work; but although it has made proposals for improving women's access to areas such as engineering and computing, it has not been able to

address fully the underlying reasons for the low numbers of women in these areas (see for example BCS, 1990). Feminist research has helped to make visible women's contributions to the development of science and technology, and to argue for the importance of women's influence over future technological developments. However, in this area there has been - and continues to be - a debate between those who emphasise the need for 'women's values' to influence science and technology, and those who find this emphasis dependent upon a problematic appeal to ahistorical, essentialist terms (see for example Rothschild, 1983; and in contrast, McNeil, 1987).

In this chapter, then, I propose to examine the strengths and the weaknesses of each of these differing areas of research. In section 2.1, I review existing research on the under-representation of women in computing, and briefly discuss initiatives aiming to increase access for women into IT-related work. In section 2.2, I move on to discuss broader themes in research on gender and technology. I focus in turn on analyses of the ways in which technology reflects patriarchal or masculinist 'shaping' (2.2.1), on suggestions that science and technology need to incorporate 'women's values' (2.2.2), and on critical attempts to examine or 'deconstruct' gendered assumptions and practices in relation to technology (2.2.3). In section 2.3, I review the connections between these largely feminist analyses and new initiatives in the sociology of technology. In

conclusion, I identify a number of specific points to be followed up in connection with information systems design (Chapters Three and Four) and with case-study analyses (Chapters Six to Nine inclusive).

2.1. Women into Technology?

An enduring under-representation of women within computing work itself has been documented from a number of different perspectives. Describing a study of the hardware and software sectors of the United States computer industry, Strober and Arnold revealed a pattern of gender segregation reminiscent of many other employment contexts. (Strober and Arnold, 1987). Drawing on 1980 figures, they found that on the software side, women were 92% of data entry workers and 59% of computer operators, but only 31% of programmers and 22% of computer scientists and systems analysts. On the hardware side, women were 72% of all assemblers but only 15% of electronic technicians and 5% of engineers. These divisions also have a race and ethnicity dimension: Strober and Arnold found Black men, and Black women in particular, to be concentrated within lower-level occupations (op. cit., p. 150-152). These figures represented an improvement on the 1970 situation, particularly on the software side; however, as other studies confirm, occupational segregation remained entrenched as the computing industry expanded during the 1980s. (Strober and Arnold refer to an 80% overall growth in computer-related occupations in the US over this period).

Kraft and Dubnoff's study of the US software industry also found that women were better represented there than in hardware related occupations - forming 24% of the software workforce, but only 2% in electrical engineering. This study again showed a clear pattern of gender segregation within the software industry: women were concentrated both within the lowest-paid occupations (such as documentation and maintenance) and within the lowest-paid industries (such as finance and communications). Although 22% of the sample of women were managers, men were three times more likely than women to be higher-level managers; women tended to be managers of other women, while men were managers of both men and women (Kraft and Dubnoff, 1983; Henwood, 1991; Henwood, forthcoming).

In the UK, some concern has begun to surface within the computing profession itself about the under-representation of women, which - from the rather limited documentation available - appears even more marked than it is in the United States. This concern is most commonly expressed in connection with a fear of skill shortages arising from the falling numbers of school-leavers:

"We are aware of a shortage of skilled professionals and have available to us a ready market (women) but are failing to tap that market. A report by the Women's National Commission states that 'women represent 50% of the nation's talent and 40% of the workforce' and yet they comprise only 10% of computer personnel."

("Wot, no women in computing?" Barbara Mcmanus and Pamela Ward, Computer Bulletin, June 1987).

The British Computer Society (of whose 'Young Professionals' Group' the two authors just quoted were members) has played an important part in a new 'Women Into IT' Campaign. This originated from an initiative taken by the IT Skills Agency within the CBI in 1988. WIT too focuses on skill shortages, from employers' perspectives, stating its key objectives as:

"To help employers to overcome current and prospective shortages of IT skilled staff by raising the number and proportion of girls and women entering and sustaining IT related careers at all levels."

(WIT, 1989, p.1).

WIT has received substantial government and employer support, and campaign material quotes one contributing employer as follows:

"A 1% reduction in staff turnover saves 500,000 off my bottom line and our experience is that women are indeed more loyal if you treat them properly."

(WIT 1990, quoted in Henwood, forthcoming).

Interestingly, the campaign materials note that:

"The situation is considerably worse in the United Kingdom than in France, the United States or the Far East. If English girls entered and sustained IT related careers

in the same proportion as American, French or Singaporean girls, there would be no current or prospective shortage of trainees."

(BCS 1990).

This would suggest, however, that there might be little impetus (from the BCS at least) to boost women's representation in computing beyond the 24% reported from the United States. This illustrates the ways in which the concerns of both WIT and the BCS are fundamentally with business and managerial objectives, rather than with any more fundamental commitment to extending opportunities for women as such.

There is a lack of comprehensive research on women in the UK computing industry. (Henwood, forthcoming). A survey carried out for Computer Economics in 1986 found that women were 2% of data processing managers, 12% of programmers and 95% of data preparation workers (quoted in Cowie, 1988). Much more recently, the BCS published a survey of its own women members, undertaken on behalf of WIT (BCS, 1990; Beech, 1991). The BCS has just over 1800 women professional members, forming some 10% of its total professional membership. Survey results were based on a response rate of just over 40% (750 questionnaires). Some 35% of the respondents classed themselves as managerial, indicating that the survey over-represents this group in comparison with programmers or analyst-programmers, each of whom formed some 10% of respondents. Nevertheless, the results did identify some important issues. 46% of the

sample had no children, leading the BCS to conclude that *"with current working conditions and social attitudes, a career and a family do not mix."* (Op.cit., p.13). 30% of the sample had in fact taken a career break to have children; but from its salary analyses, the BCS estimated that the effect of doing this *"is equivalent to reducing your salary by between 5k and 10k per annum."* In more general terms, the survey indicated the existence of a 'career ceiling' for women, most of whom earn under 25k. (Op.cit., p.15).

The BCS report concludes with a statement of the possible causes of women's under-representation in computing which does comment on employers' influence as well as on the ways in which factors external to the workplace, such as education, discourage many girls and women - noting for example that:

*" - two thirds of IT employers do not recruit trainees;
- the minority who recruit trainees have tended to use methods designed to attract and select mobile young male technical graduates and to provide working conditions and staff development paths tailored for this group."*

(Op. cit., p.17).

Their recommendations for change, in connection with WIT, include both a range of training and retraining measures and - more radically - projects to open up what they identify as *"the natural career path from office administration to departmental computing."*

In this way, the BCS and WIT material aims to take into new business contexts proposals which are very similar to the equal opportunities measures which have developed in earlier research on women and information technology, and in the 1984 'Women into Science' (WISE) initiative (Davidson and Cooper, 1987; Henwood, 1991).

There are weaknesses in these approaches, however, in two respects. Firstly, they leave intact a number of the gendered assumptions which are an integral part of the inequalities they describe. For instance, the association between women and domestic responsibilities remains unquestioned: issues such as career breaks or childcare provision are only discussed in relation to women's implied 'special needs', rather than as across-the-board improvements in employment practice.

Secondly, in seeking to take tactical advantage of employers' concerns over skill shortages, initiatives such as WIT make themselves intensely vulnerable to economic and labour market fluctuations, as illustrated by the recruitment freezes and job losses which occurred among computing personnel in the UK during a period of recession in 1990 and 1991. They also adopt an uncritical approach towards information technology itself, implicitly assuming that it generates an uncontroversial range of skill requirements in a somewhat deterministic way. (Henwood, forthcoming). The only hint of a more critical edge comes in the suggestion that a career path from office administration to departmental computing could be opened

up. This kind of proposal could usefully build on analyses of women's clerical skills (Gaskell, 1987), and form part of human-centred approaches to systems design and job design. However, to date it has featured within the economic strategies of left-of-centre local authorities (LSPU, 1989), rather than those of commercial employers (see Chapter Ten). Within the public sector, however, resources have not been forthcoming so far to give sustained practical support to these policies (Hales and O'Hara, forthcoming).

In some respects, gender divisions within computing appear to be becoming more marked rather than less: for instance, UCCA figures on university entrance show that women were 24% of entrants to computer studies courses in 1980, but only 10% in 1987 (Lovegrove and Hall, 1987; Dain, 1988). This tends to add to evidence from other quarters, indicating the limitations of equal opportunities initiatives, in their current forms, in relation to entrenched patterns of gender inequality (Webb and Liff, 1988).

In the following two sections, I turn to research which has aimed to address gender issues in greater depth, with reference to technology.

2.2: Science, Technology and Gender:

In a comprehensive summary, Judy Wajcman points out that feminist analyses of technology have mirrored feminist

analyses of science in many respects, while being both more recent and less theoretically developed (Wajcman 1991, p.14-15). Pointing out that debates within the sociology of scientific knowledge have exposed as simplistic the notion of technology as 'applied science', Wajcman concludes that

"...the current model of the science-technology relationship characterizes science and technology as distinguishable sub-cultures in an interactive symmetrical relationship."

(Wajcman, op.cit., p.14; see also Barnes and Edge, 1982).

An initial step within feminist research has been to begin to make visible the contributions women have made to scientific and technological developments. Biographies have emerged of important women scientists (e.g. Fox Keller, 1983); inventions to which women contributed have been identified as including the cotton gin, the small electric motor and others (Wajcman, op.cit.). In the field of computing, Ada Lovelace's work on approaches to programming Babbage's original 'analytical engine' has received some recognition; so too have the ways in which programming was initially viewed as a routine job, assigned to women clerical workers, then redefined as a 'technical' job in which men came to predominate (Faulkner and Arnold, 1985). Commenting on the male bias in most technology history, Ruth Schwartz Cowan observes:

"The indices to the standard histories of technology... do not contain a single reference, for example, to such a significant cultural artifact as the baby bottle. Here is a simple implement... which has transformed a fundamental human experience for vast numbers of infants and mothers, and been one of the more controversial exports of Western technology to underdeveloped countries - yet it finds no place in our histories of technology."

(Schwartz Cowan, 1979, p. 52, quoted in Wajcman op.cit., p. 17).

In terms of IT in general and HCS specifically, there are two important themes in research on gender and technology. Firstly, it has been argued that both science and technology (including IT) have been constructed and shaped almost entirely by men, and that scientific and technological ideas and practices continue to reflect patriarchal or masculinist perspectives (1). Further research is needed in order to explore to what extent, if at all, processes of information systems development conform to these patterns. To date there has been very little sociological research in the UK on the processes of systems development, as distinct from staffing within computing, or from the use of implemented systems; even in Scandinavia, where this kind of research is somewhat more in evidence, it is rare to find explicit gender perspectives (Tijdens et al, 1989). HCS research can therefore usefully contribute to analyses in this area.

Secondly, what pressures or opportunities exist for change

in the established patterns of gender inequalities in science and technology? Here, there have been diverging responses, from feminists and others. Some have argued that both science and technology need the influence of 'women's values', in order to counter what are seen as the distortions and the exclusions of the past. Others have responded that this view itself perpetuates gendered dichotomies, with its implicit or explicit contrast between women's caring labour and a scientific rationality shaped predominantly by men (see for example Rose, 1983); or - within computing - women's 'soft' rather than 'hard' mastery (Turkle, 1984). These critics have argued that instead the emphasis should be on trying to analyse and 'deconstruct' the complex gender differences which are reproduced within scientific and technological discourses (McNeil, 1987; Haraway, 1991). New developments in the sociology of technology have not tended to integrate gender perspectives to date; however, they do provide some opportunities for this to take place (see section 2.3 below). In the following sections, I examine how appropriate any of these emphases might be for HCS research.

2.2.1 Male Domination in Science and Technology:

From varying perspectives, analyses have been developed of the ways in which both science and technology have come to reflect and reproduce patriarchal or masculinist practices and perspectives. Both Cockburn (1985) and Faulkner and Arnold (1985) summarise historical and anthropological

material as a background to their own detailed studies of contemporary technologies. They cite evidence which suggests that women were the first 'technologists', prompted to develop tools and methods for cultivating, preparing and preserving food because of the need to care for children. Cockburn quotes evidence of a shift from small, egalitarian communities towards hierarchical, centralised and male-dominated societies:

"as the neolithic ceded to the bronze age... the rise of class society is associated with a shift to patrilineality... and to patrilocality."

(Cockburn, op.cit., p.21).

The appropriation of tools, weapons and technological skills became a way of controlling people; and the more powerful in society - men more than women, the wealthy more than the poor - increasingly owned or controlled them. Cockburn describes this pattern as continuing as first the feudal and then the capitalist mode of production evolved, and production shifted away from the household to the factory. With this shift, the basis emerged for the identification of men with the 'public' sphere of paid work, and of women with the 'private' one of the home and family. These developments were characterised by conflicts, for instance between skilled craftsmen and employers, and between men with skilled status and others - men, women and children - who were considered unskilled.

Faulkner and Arnold add to this broad canvas an account of the ways in which modern Western science was founded upon an explicitly masculine 'Natural Philosophy' (1985, p.26). Nature was to be subordinated to scientific control and investigation. The traditional healing skills of women were defined as witchcraft, and eradicated with violence on a scale which remains quite difficult to appreciate fully (Thomas, 1971).

These analyses do not suggest a biological basis for the sexual division of labour, but describe instead a complex inter-relationship between the development of class society and various forms of patriarchal or male domination both in production, and in the definitions and practices of science and technology. Nevertheless, they do identify child-bearing as crucial. Cockburn suggests that:

"caring for both self and young, females are the more likely sex to have invented the digging stick, the carrying sling or bag, the reaping knife."

(Op. cit., p. 20).

Faulkner and Arnold argue:

"the biological division of labour has provided men with a rationale for excluding women from certain areas of productive activity, and often for extending the time women spend in childrearing beyond that which is

biologically necessary."

(Op. cit., p.26).

Like Keller (1983), they refer to a psychoanalytic framework, in order to explore the ways in which current gender divisions of labour are manifest at the personal, emotional level. The 'other' from whom young children have to distinguish themselves as they mature is almost always a woman, whose nurturing responsibilities receive little public reward or recognition. Boys learn to see women as 'other' and to devalue the caring, affectionate aspects of their own personalities; girls are more likely to develop sophisticated 'caring' skills, but also to underestimate these as well as their other abilities. Arnold and Faulkner conclude with a decisive rejection of biological determinism, however:

"The biological differences between the sexes... constrain human behaviour rather than determine it. The differences are material - men are unable to give birth or suckle young - but the constraints they place on human behaviour are also very loose. There is no biological reason why men should not share in most aspects of child-rearing, and there is no biological reason why women should not share in the designing of our social relations. Indeed, if social roles were changed in this way, we would expect a qualitative change in the psychological characteristics laid down in infancy."

(Op. cit., p. 26).

Clearly, this is a very brief summary of an important and complex area. Support for the arguments summarised here can be found both in evidence from psychology and anthropology, documenting how widely patterns of child-rearing and gender difference do vary (see for example Oakley, 1972). Orbach and Eisenbaum (1983) draw on their own experience as therapists, to analyse the conflicts men and women experience in sustaining close personal relationships in a context of gender inequality. Keller (in Rothschild, ed., 1983), links the contrasting early childhood experience of boys and girls to the association of rationality and objectivity with masculinity rather than femininity.

One of the most detailed critiques of science and technology as patriarchal has been developed by Easlea (1983), building both on the themes outlined above and on his earlier analyses of the history and philosophy of science (1973). In 'Fathering the Unthinkable', he argues that *"the nuclear arms race is in large part underwritten by masculine behaviour in the pursuit and application of scientific enquiry"* (1983, p. 5). Describing the development of nuclear weapons during the Second World War, he provides graphic illustrations of the obsessive and passionate involvement of the 'Manhattan Project' team - their absorption in 'technical' breakthroughs enabling them to detach themselves from (or even celebrate) the ensuing devastation at Hiroshima (Easlea op.cit., p.112). For Easlea - as for Faulkner and Arnold - the emotional

and psychological processes of early childhood are crucial here; in his view, 'giving birth' to scientific achievements, including weapons of mass destruction, can be a way in which male scientists compensate for their inability to bear children. In support of his argument he cites the common use of birth and rape images by male scientists and technologists, including the naming of the first atomic bomb 'Little Boy'.

Easlea has been criticised for placing too much emphasis on image and metaphor in scientific and technological exchange, and for failing to explore fully the social processes through which these specific forms of masculinity have evolved and become dominant, in relation to science and technology:

"as Adam Farrar (1985,p.61) comments, these birth and rape metaphors 'only show that the means of representing significant practices in a male dominated culture are constructed in terms which are significant to men. They don't show that the practices so represented are necessarily masculine'"

(Wajcman, 1991, p. 139-40).

This tendency towards a form of essentialism is present within Easlea's work, as in other strands of the research into gender, science and technology (see section 2.2.2 below). Nevertheless, it does not prevent his work from making a substantial contribution, if a problematic one,

to the establishment of gender perspectives as a legitimate area within the history and politics of science.

From a somewhat different angle, Sally Hacker (1989) also traces links between technological and military practices and gender divisions. She shares Lewis Mumford's view (1972) that the "need for a common symbolic culture" has stimulated and shaped technological transformations even more than the need to increase the food supply or dominate nature. (Op. cit., p. 9). Following Weber to some extent, she associates the emergence of military formations in particular with patriarchy, in early class societies:

"Separate, differentiated from society in general, military institutions emerged some 5,000 years ago. They arose with, and depended upon, women's structured subordination to men..."

(Hacker, op.cit., p.10).

She goes on to outline the ways in which the technological work of engineering was also shaped in hierarchical, military ways:

"the term 'civil engineering' was coined in the eighteenth century, to distinguish it from more typically military pursuits. (B. Hacker, 1986). The first engineering schools, as was West Point, were military academies. Graduates often reshaped workplaces after these military institutions..."

One of the most vivid, detailed and widely-known accounts of IT-related work is Tracy Kidder's "The Soul of a New Machine" (1982). Basing his account on observations made at Data General in the USA, Kidder reconstructs the race to beat the competition, and be first to create the hardware and the software for a new kind of mini-computer. Kidder's purpose - and his achievement, for the book won the Pulitzer prize in 1982, and became a best-seller - is to capture the drama of the endeavour: the interpersonal relations and tensions, all interwoven with the hardware and software design challenges and achievements.

Two points are of interest here. Firstly, Kidder paid no explicit attention to gender issues; nevertheless, his detailed material provides ample illustration of the gender dynamics which sociologists have begun to describe from theoretical perspectives, in connection with information technology. The key actors in this drama are all men, whose relationships outside work become entirely eclipsed by their involvement in the project. Two women are present in the wings: a lone woman engineer, and Rosemarie, the secretary, referred to by Kidder as an initially reluctant but eventually committed 'surrogate mother'. So far, so predictable. But secondly, these descriptions of the inter-relations among men, through and around technology, do capture the complexities of the situation. The process of designing and producing the 'Eagle' prototype is dominated by detailed, 'technical' activities. But far from being characterised by logic and

control, these activities are characterised by intense emotion: excitement, fear of failure, moments of despair. Above all, this is a social process: the 'Hardy Boys' and the 'Microkids' communicate through the medium of the software and hardware they are building - playing, competing, collaborating - in contrast with other images of men as equally compulsive but socially isolated students or hackers (Turkle, 1983). This is not an account of technology as being under men's tight and unproblematic control; instead, technology appears as one site upon which men can secure personal identity, generating a specific and exclusive culture - but this is a terrain fraught with its own difficulties and contradictions.

Clearly, there is much within recent studies of science, technology and masculinity which remains speculative to some degree. Issues concerning the ways in which early class and patriarchal relations were established are still debated by historians and anthropologists - although the agenda for such debates has been considerably expanded by feminist contributions, including those which have begun to bring technology into the picture. Similarly, the relationship between early childhood experience and social processes remains controversial, and not only in relation to gender (Craib, 1990). Initiatives in Human-Centred Systems research do not have the scope to make fundamental theoretical contributions in these areas. However, what is appropriate, for HCS research, is to acknowledge the evidence that technology has been shaped by gender

divisions. In the specific context of software design, there is scope for HCS research to contribute to emerging analyses of the interconnections between information technology design and implementation processes and gender inequalities (see Chapters Six to Ten).

2.2.2 Technology: Men's Power, Women's Values?

In section 2.1, I referred to the ways in which 'equal opportunities' approaches to science and technology can tend to reinforce an implicit view of men as 'the norm', and of women as marginal. In contrast to these approaches, there have been arguments for a recognition of women's values and experience in their own right, and for the importance of bringing these to bear on scientific and technological practices. One of the most prominent advocates of human-centred approaches to technology, Mike Cooley, provides an example, commenting on the 'male values' which have shaped technological developments to date - that is:

"...the values of the White Male Warrior, admired for his strength and speed in eliminating the weak, conquering competitors and ruling over vast armies of men who obey his every instruction... Technological change is starved of the so-called female values such as intuition, subjectivity, tenacity and compassion."

(Cooley, 1980, p. 43).

Along with Rosenbrock (1989), Gill (1990) and others within the Human-Centred research tradition, he has argued

that categories which have been counterposed within a male-dominated technological tradition - 'objectivity' versus 'subjectivity,' rational knowledge versus tacit knowledge - should instead be recognised as interdependent. There is a clear parallel here, although an unacknowledged one, with the work of feminists such as Hilary Rose (1983) in science, and Joan Greenbaum in computing (1987). In similar vein, Pacey (1983) associates women with "user or need-oriented values" in connection with technology, in contrast with male preoccupations with technical virtuosity and with economic values. Despite these general statements, however, Human-Centred Systems research itself has remained - with one exception (Gill, 1990) - largely confined to areas of work which derive their status substantially from male-dominated craft traditions (see Introduction and Chapter Four).

From a social psychological perspective, Sherry Turkle has put forward one of the most detailed arguments for the recognition of distinctively female approaches to technology (1984). In her studies of school children learning to use computers and to do simple programming, Turkle found that boys and girls tended to develop different 'styles'. "Hard masters" - overwhelmingly boys - worked to a structured, linear plan, emphasising control over the machine. Girls were more likely to be "soft masters", with what Turkle referred to as a more "negotiating" or "interactive" approach. Turkle compares

these patterns with Levi-Strauss' distinction between Western science - emphasising planning and control - and the science of pre-literate societies, characterised by 'bricolage':

"The former is the science of the abstract, the latter is a science of the concrete. Like the bricoleur, the soft master works with a set of concrete elements. While the hard master thinks in terms of global abstractions, the soft master works on a problem by arranging and rearranging these elements, working through new combinations."

(Turkle, op. cit., p. 103).

Echoing Gaskell's arguments regarding clerical skills (1987; see Chapter One) Turkle's view is that the problem for women is not in their specific skills or programming styles, but in the undervaluing of these. That is, "soft mastery" is a perfectly effective strategy, but it is not recognised as such within the prevailing cultures in computing. Taking these themes further, there have been suggestions within computer science recently that women's skills and experiences can be particularly well-suited to some areas of work. Ruth Carter, for instance, has argued that many women's daily experiences of balancing different demands, within the frameworks of job and household, have a particular affinity with systems thinking (Carter, 1990).

Turkle's work does provide detailed accounts of differing experiences of girls and boys within computing, as

currently practised. It also underlines the importance of establishing practical initiatives in computing for girls and women, through which they might be able to gain recognition, to challenge the devaluing of their skills and their approaches, and to explore a range of 'styles'. From a sociological perspective, however, her suggestion that gender differences in computing approaches derive from differing basic cognitive styles is more open to question. Many studies of sex differences in behaviour have found that variations within male or female patterns can be cgreater than those between the sexes (Fuchs Epstein, 1988). There is also substantial evidence, within education, of the ways in which computing has become predominantly a boys' domain in social terms; studies also illustrate how contradictory teachers' expectations of girls can be - i.e. that they should be 'feminine' (compliant, polite) in ways which do not combine easily with intellectual achievement (Kelly, 1981; Walkerdine, 1989; discussed in Wajcman, 1991).

We have seen, then, some examples of research seeking to assert that distinctively feminine values and experiences exist, which could counter men's dominance in relation to technology. At the same time, the examples discussed above do appear to be flawed by a tendency to invoke an essentialist and somewhat ahistorical view of gender differences - a tendency which undermines their proponents' concern to combat gender inequality. In a comprehensive review, Maureen McNeil very usefully places these themes in historical context (1987). She

illustrates the contradictory ways in which both the women's peace movement and some 'eco-feminist' groups have initiated challenges to male values and practices; yet, in putting forward a view of women as 'naturally' less warlike or inclined to degrade the earth, some strands within these movements have reinforced gender stereotypes rather than undermining them.

McNeil's cautious comments helpfully alert us to the dangers of simplistic and superficially attractive arguments. However, the picture is complex: there is a world of difference between essentialist appeals to 'feminine' affinities with nature, for instance, and the new work being undertaken by some women scientists in relation to ecology, combining theoretical discussion with activism (see for instance the recent work by the Indian women physicist, Vandana Shiva, 1990).

2.2.3 Gender, Class and Technology:

Maureen McNeil's own work is within a tradition which has aimed to bring together materialist approaches which draw on Marxism, and feminist analyses of gender. This body of work includes a number of recent studies of technological change, which have focused attention on the ways in which relations of gender and class co-exist and inter-relate. these studies have included both detailed case-studies and substantial theoretical reflections, and below I discuss both aspects in turn.

Case-Studies:

In the UK, Cynthia Cockburn's work has been particularly prominent and innovative, in relation to gender and technology. Her study of printers (1983) stands out as a rare example of an analyses of men's experience of work, which explicitly addresses gender issues. Cockburn provides a detailed historical account of the way in which men established themselves as skilled compositors, partly in opposition to women and to other 'unskilled' workers; she also illustrates the tensions and conflicts the men faced, with the introduction of computerised photo-composition. Cockburn argues that such a period of restructuring both poses grave threats - loss of jobs, and of trade union strength - but that it can also offer opportunities to construct a new basis for solidarity between men and women working in the printing industry. Here, she outlines some possible strategies, including the development of a single media workers' union, capable of linking currently-divided groups of workers over issues such as pay, skill definitions, working hours and equal opportunities.

In 'Machinery of Dominance' (1985), Cockburn describes case-studies in the clothing industry, mail-order warehousing, and in NHS hospital radiography. She also 'goes upstream' to investigate some of the engineering firms which produce equipment used in these organisations. In general, technological change is seen to form part of a reorganisation of jobs and work processes from which men and women very rarely emerge on an equal basis. In some

cases, the differences are extreme: Cockburn found one single woman engineer, in the three engineering firms she visited. In others, women had entered previously all-male areas - such as pattern-making and cutting, in clothing - but only after computerisation had been accompanied by the erosion of their previous craft status and pay, and after many men had left. There were also instances of tension and unresolved conflict, as in radiography: here, women radiographers expressed reluctance to sacrifice closeness to the patients in order to get close to technology, or to climb the career ladder (op.cit. Chapter Four). Men are in a minority in radiography, and tend to concentrate on diagnostic rather than therapeutic work; they also occupy senior positions in disproportionate numbers. A few men wanted to reject the "crude identification" of men with science, technology and successful careers, and to express both their appreciation of working alongside women radiographers, and their determination to develop the caring, patient-oriented aspects of the job. However, these examples were all students who had yet to face the full pressures of a developing career (or family demands).

Cockburn's interviews also addressed respondents' choices and views about personal life. As in the workplace, there are examples of people who want to "buck the gender system", and who aspire to what Cockburn calls "wholeness". However, Cockburn found that:

"the experience of many couples is that the tentative step they may take when they first set up home, to reverse

conventional gender differences, once it is itself reversed by the hard realities of work and children, is all but impossible to re-establish."

(Op. cit., p.215).

Cockburn concludes her analysis of these substantial case-studies by emphasising a number of findings:

(i) The sexual division of labour remains central, both in personal life and in occupations;

(ii) It is reproduced at many levels, for instance in ideological and cultural images of masculine and feminine behaviour, as well as through material inequalities in pay or career opportunities. Specifically, 'gendering processes' operate within the workplace, and not only in processes of socialisation or in the household: "both people and occupations are gendered."

(Op. cit., p. 231).

(iii) Technological practices (design, training, access to and use of equipment) play a key part in these gendering processes. Many men are able to use technology to confirm their masculine identity, as well as to improve work or career opportunities. In contrast, women most commonly remain confined to the role of operator.

(iv) Men benefit from the sexual division of labour: both from women's work within the home, and from a labour market structured "in such a way that those women who enter it do not compete with men for all the available jobs" (op. cit, p. 230). Men pay a price for this, for instance in terms of stress and personal conflicts - but

in Cockburn's view, women pay a higher one. On occasion, men may sacrifice immediate economic interests and opt for redundancy, rather than crossing the gender boundaries and taking a 'woman's job': *"it may be that keeping a distance between men and women is even more important in principle for masculinity than keeping jobs"* (op. cit., p. 233).

(v) Women are pressing to gain access to technological areas of work, often experiencing stress, isolation and discrimination in the process. Initiatives such as women's training schemes can improve the situation. But women need these changes as well as a revaluing of the caring or nurturing work associated with femininity - not instead:

"men need more urgently to learn women's skills that women need to learn men's... the right decisions about technology will only be made by people who, like radiographers, have to deal not only with machines, but, at first hand, with human life and pain."

(op.cit., p.256-7).

Pursuing similar themes, Game and Pringle (1984) provide somewhat less detailed accounts of the flexible persistence of the sexual division of labour, in an Australian context. Their six case-studies cover manufacturing, retailing, banking, medicine, computing and housework. Much of their empirical material confirms the picture described by Cockburn. For instance, in banking, they found that the large increase in the numbers of women

employed in the postwar period had been accompanied by routinisation of the work in lower grades - those increasingly occupied by women; gender inequalities allowed men to take advantage of the decreasing career opportunities available (c.f. Crompton and Jones, 1984). In hospitals, the increasing numbers of women doctors and male nurses appeared to unsettle conventional gendered patterns to some extent: Game and Pringle found that many doctors (male)

"generally can't acknowledge that male nurses are nurses. As far as they are concerned, nurses are women, and the objects of their sexual attention..." (op. cit., p.110).

However, male nurses - like Cockburn's male radiographers - tended to emphasise the those aspects of the job defined as 'technical' or professional, rather than basic patient care, and to progress more rapidly than women up the career ladder.

Game and Pringle have in common with Cockburn an identification of gender divisions as being reproduced within the workplace, as well as elsewhere. Like Cockburn, they also describe the constraints and the opportunities both men and women face, in contexts of technological change, and emphasise the importance of supporting initiatives for change. Aiming to avoid a narrow economic account of technological change, they deliberately addressed what they called 'the symbolic' in their interviews:

"by linking machines and computers to masculine power and sexuality we are delving into the social processes which create the new technology and give it its particular meaning."

(Op. cit., p.142).

In terms of assessing the case-study research summarised here, it has been suggested that Cockburn over-emphasises gender similarities at the expense of acknowledging class differences (West, 1990, mentioned in Chapter One). It has also been suggested that Cockburn tends to overestimate the extent to which men can exercise real power, through access to technology. McNeil, for instance, suggests that a distinction should be made between the "representations" and the "realisations" of power (1987, p.194). Acknowledging the links implied between power, masculine identity and technology in computer adverts, for example, she suggests that many men who buy home computers will never 'realise' the powerful images the adverts offer.

McNeil also suggests that Cockburn accepts too readily that women are technologically ignorant, and are passive victims of technology (op. cit., p. 193). McNeil herself is concerned to question boundaries and definitions, in relation to technological competence, and here Pam Linn's contribution to her edited collection is relevant. Linn shows how in the relatively friendly and informal context of a community-based Technology Network in London,

different activities were implicitly constructed as 'hard' or 'soft', 'technical' or not. Thus it proved hard to to get Network support for a dress-making project; the fact that the project involved both design activities and machine maintenance was overshadowed by the 'non-technical', feminine associations dress-making has. More broadly, Linn challenges the assumption that association with machinery and with certain kinds of products adds up to defining a process as 'technical'; she argues that the *"'soft' work of communication and organisation, across and between labour processes"* itself needs to be seen as an integral part of a technical production process (Linn, 1987, p.146). Echoing the arguments developed by Phillips and Taylor (1986) in relation to gender and skill, Linn suggests that this work often remains invisible or low-status - 'soft' and non-technical - because it is associated with women.

While McNeil's first comment may be fair regarding some of Cockburn's more general statements, I would argue that the detailed presentation of case-study material, particularly in 'Brothers' (1983), does illustrate complexities and ambiguities in men's relationship to power and to technology. The second point - the need to redefine 'the technological' in terms which acknowledge women's experiences - is in fact something for which Cockburn argues herself, particularly in "Machinery of Dominance". More accounts of efforts to initiate these redefinitions are certainly needed, but there is no reason in principle why they could not be seen as complementing efforts to

broaden women's access to technology, rather than as being an alternative strategy. In spirit at least, there seems little major difference between Cockburn and McNeil here.

Game and Pringle's book is less comprehensive than Cockburn's, and is open to question in various respects. Lacking the review (albeit limited) of historical and anthropological material which Cockburn (like Arnold and Faulkner) does provide, Game and Pringle still refer very briefly to pre-capitalist processes. They comment that *"it seems likely that the sharp distinction between 'work' and 'non-work' (and with it the concept of the [sexual] division of 'labour') only emerged with capitalism."* (Op. cit., p.140).

However, this comment overlooks substantial debates within anthropological research, indicating a link between an unequal sexual division of labour and various forms of class society, including pre-capitalist forms (see for example Rosaldo and Lamphere, 1974). Similarly, their account of the different ways in which men and women deal with the relationship between 'public' and 'private' areas of life is sometimes sketchy. They suggest that the split is relatively unproblematic for men, whereas women often cope with it by insisting on a clear separation between the two. Alongside Cockburn's more complex account of the often difficult negotiation of this split, undertaken both by women and by men, statements like this seem simplistic. Finally, as Liff points out (1987), Game and Pringle tend simply to describe situations in which men have succeeded

in laying claim to skilled and 'technical' areas of work. Liff suggests that in order to understand how these patterns have developed, specific analyses are needed of men's predominance in design, organisation and maintenance roles in production. This would require a more thorough analysis of specific labour processes than Game and Pringle undertook, and would develop a theme at which they only hint - that is, the ways in which gender divisions themselves have shaped the emergence of particular jobs and technologies. (Liff, 1987, p.183-4; Mackenzie and Wajcman, 1985).

Theoretical Considerations

The case-study aspects of the research discussed above provide abundant illustration of the ways in which gender relations are reproduced within the workplace. They thus contribute to overcoming the ways in which labour process theory, for instance, has tended to associate class relations with paid work and gender relations with socialisation or the household. But this research has also raised broader questions, concerning how gender and class relations should be understood. While this thesis does not seek to make a theoretical contribution in this area, it is important to acknowledge the ways in which these broader questions have arisen in studies of technological change.

Faulkner and Arnold, Cockburn and Game and Pringle all refer to the concept of patriarchy as well as to class

relations, in their accounts of gender divisions and technological change. But in fact, neither Arnold and Faulkner nor Game and Pringle deal particularly thoroughly with the theoretical issues raised by such an approach.

Game and Pringle reject the possibility of conceptualising class and gender as two distinct systems, asserting that this results in both a narrow definition of capitalism, and an ahistorical treatment of the sexual division of labour. Instead, they view capitalist society itself as patriarchal:

"the sexual division of labour, then... is a basic dynamic in capitalist societies... it is as important as class for analysing capitalism... It is essential to take account of the ways in which gender relations and class relations shape each other."

(Op. cit., p.15).

They describe patriarchy as operating through the preservation of 'splits' - between the economy and nature/culture; between objectivity and subjectivity, rationality and emotionality, the public and the private, work and leisure.

Game and Pringle's view that the sexual division of labour "is as important as class for analysing capitalism" is supported by their empirical accounts of gender divisions in the workplace. But their statement that conceptualising two distinct class and gender systems is unsatisfactory rests on a brief reference to the

limitations of previous feminist debates, rather than on sustained argument. In the absence of any precise formulations of the distinction between class relations and patriarchal relations, a number of important points are submerged or lost - for instance those made above regarding evidence of pre-capitalist forms of the sexual divisions of labour, and of the problems which men face in connection with gender.

Faulkner and Arnold do adopt an explicit concept of patriarchy as a distinct system, following Heidi Hartmann's definition of it as:

"a set of social relations between men which have a material base, and which, though hierarchical, establish or create interdependence and solidarity among men that enable them to dominate women... In the hierarchy of patriarchy, all men, whatever their rank in the patriarchy, are bought off by being able to control at least some women."

(Hartmann, 1981; quoted in Arnold and Faulkner op.cit., p.19).

Faulkner and Arnold then give a historical account of the development of the sexual division of labour and of capitalism, as outlined earlier in this chapter. In this account, both the material benefits for men of the sexual division of labour, and the existence of divisions among men, are discussed. The underlying implication is that patriarchal and capitalist relations coexist, combining to

constrain women in the family and in the workplace. But the question of how these distinct sets of relations interconnect is not seen as problematic, nor addressed explicitly. In fact, the explanatory emphasis gradually shifts towards the centrality of capitalist relations; patriarchal relations tend to be described in terms of the difficulties they pose for women, rather than in terms of the different ways in which they are experienced both by men and by women.

Cockburn (1986) goes further, in terms of clarifying the theoretical issues regarding class and gender. She takes as her point of departure the evidence from her own studies of technological change, that *"within a familiar system of class relations of employment, of production (at work) and consumption and reproduction (at home), power relations of sex and gender are also active and need to be theorized."* (1986, p.78). She finds that theories which only focus on class ignore evidence that men can benefit from the subordination of women at work as well as at home - and evidence of the ways in which men have organised formally and informally to exclude women or to resist equal pay. She also suggests that attempts to develop a 'unitary theory' (like Game and Pringle's 'patriarchal capitalism') have met with two problems: either the tendency to drift towards subsuming gender relations within class relations, or the tendency to talk in terms of two systems in specific instances, despite the assertion that a single one exists in theory.

Cockburn goes on to take up the criticisms of patriarchy, theorised as a distinct system, made by Game and Pringle and others. She demonstrates ways in which the concept can be applied in both a historically-specific and a multi-dimensional way; she too takes up Hartmann's definition, but in a somewhat clearer formulation:

"The material basis of patriarchy is men's control over women's labour power. That control is maintained by excluding women from access to necessary economically productive resources, and by restricting women's sexuality."

(Hartmann, 1979; quoted in Cockburn 1986, p.84).

Cockburn proposes a materialist method drawing both on this definition, and on the Marxist concept of class relations. She suggests that in specific analyses, such as the historical study of technology, the two sets of relations need to be seen as developing at different paces, and with different effects. Both sets of relations are seen as being manifest in economic, social and ideological terms; thus the danger of discussing the family in terms of patriarchy, for instance, and work in terms of class, is avoided. Cockburn also suggests including "men's physical power and initiative" in the definition of the material basis of patriarchy. Her aim is to create ways of analysing both men's 'tenure' of technology, and practices such as men's violence against women, without resorting to crude biological reductionism. She concludes by proposing the concept of 'sex-gender

system': gender relations conceived of as capable of change, and of non-patriarchal forms.

Cockburn's approach has much in common with work by Sylvia Walby (1986), who also builds on the analyses of patriarchy put forward by Hartman. Her analyses do not focus on technology, but do include a detailed, historical account of the development of women's employment in office work. Overall, Walby's contribution is distinctive in three main respects:

(i) She specifies the elements which she sees as making up the patriarchal system - that is:

"a limited number of relatively autonomous structures... the key sets of patriarchal relations are to be found in domestic work, paid work, the state and male violence and sexuality; while other practices in civil society have a limited significance..."

(Op. cit., p.50).

Walby adds that *"patriarchy is never the only mode in a society, but always exists in articulation with another, such as capitalism... the actual pattern of gender inequality should be seen as the outcome of the interacting of these two systems together with that of racism."*

(ii) She rejects the view (held by Hartmann) that there is a 'neat fit' or harmonious articulation between capitalist and patriarchal relations: *"the relations between patriarchy and capital should be seen as*

historically and spatially variable and riddled with conflict" (op.cit., p.89).

(iii) She demonstrates the scope of her theoretical model with reference to the history of employment in cotton textiles, engineering and clerical work, since 1800. Here, she cites historical evidence of struggles between male workers and employers over the issue of whether or on what terms women should be employed. In particular, Walby finds that almost all trade unions developed strategies - initially of outright exclusion, later of 'grading and segregation' - through which to ensure the continued subordination of women. She also presents evidence of the ways in which women workers resisted these strategies, and took action to preserve or extend their employment opportunities.

Walby concludes:

"It is with such evidence in mind that I dispute the theories of those who argue that it is women's position in the family which leads them to choose a lesser form of engagement in paid work than men. Rather the issue is, why do women suffer such appalling conditions of work in the family as many do? Why do women marry on such terms? The answer is that the options for most women in paid work are not much better, because men have usually been successful in excluding women from the better forms of work."

(Op. cit., p.248).

There is not scope here to comment on all the aspects of Walby's very detailed arguments. Certainly, they are contentious. One aspect which raises especially controversial issues is her analysis of social relations in domestic work specifically as a domestic mode of production, in which the husband expropriates the wife's surplus labour. Another is the degree of importance she attaches to structures of ethnic inequality. These are acknowledged to contribute both to patterns of class and gender inequality, and not to be reducible to them - but "in practice, however, the dynamic of ethnic inequality is quite tightly bound up with the development of capitalist relations" (Walby, op.cit., p.52). This leaves considerable ambiguity regarding the importance attached to patterns of racial inequality.

The strengths of Cockburn's and Walby's 'dual systems' framework appear to me to be in their ability to pose questions about the shifting inter-relations between relations of class and gender (and potentially also of race) in specific contexts. This kind of approach can help to expose for discussion the ways in which gender relations have been rendered invisible in research, such as HCS, which has taken shape predominantly in a class relations perspective. By suggesting that relations of class and of gender are often in tension with each other, Walby avoids portraying a static 'fit' between the two, within which women might be seen as passive victims; in fact, her historical material helps to reveal the extent

of women's active attempts to challenge subordination. Both Walby and Cockburn show evidence of enduring gender inequalities, notably within the workplace, which has been ignored or marginalised within much social science research. Walby's historical account of trade unions' 'grading and segregation' strategies, for instance, underlines the importance of identifying factors in current trade union policy and practice which might hinder - or facilitate - human-centred systems initiatives. Cockburn maps out the ways in which technology has become a particularly important terrain on which gendered identities are established and contested. For HCS, then, it is important to examine how far information systems development practices can offer further opportunities both to analyse these processes, and to develop initiatives within which gender inequalities can be challenged.

However, the question of appropriate approaches to the analysis of power relations, at both 'macro' and 'micro' levels, continues to be debated within new research in the sociology of technology, and in the following section I note some of the main features of this research.

2.3 New trends in the Sociology of Technology:

A brief review of recent social science literature on IT shows both expansion and diversity, in perspectives and in subject matter. There are now some preliminary studies of the history of software production, and of current software development practices (see for example Pelaez,

1988, 1990). In particular, the ESRC-funded 'Programme on Information and Communications Technologies' (PICT) has made substantial contributions. In view of the scope of PICT, and its ability to illustrate recent research and work in progress, a number of research papers from the programme are relevant to further research in HCS.

In their report on current research on 'Social Perspectives on Software' (1990), Murray and Woolgar provide a useful overview (to be developed further in Murray and Woolgar, eds, forthcoming). Firstly, they identify and compare a range of theoretical approaches. 'Constructivist' sociologies of technology, rooted in the sociology of scientific knowledge (SSK), share the central tenet that "the very content of scientific knowledge can be understood as a social product. By contrast with earlier approaches to the social study of technical products, SSK shows that the social and cultural circumstances of production have a specific bearing on the form and content of technical knowledge." Murray and Woolgar, 1990, p.10). The major point that follows, with particular relevance to studies of IT and systems development, is that:

"the distinction between technical and social is itself the upshot of social process. This distinction should not therefore be taken as the given... Rather, it is the accomplishment and perpetuation of this distinction which requires explanation."

(Murray and Woolgar, op.cit., p.10-11).

Murray and Woolgar provide a number of examples of current research projects in which this line of argument is being pursued, for instance concerning the design and production of computer hardware (Molina, 1989), and analyses of the computer virus phenomenon (Woolgar and Russell, 1989).

Criticisms of constructivism in the sociology of technology have come from an ethnomethodological perspective, suggesting that these approaches pay too little attention to the specifics of a given technology (Anderson and Sharrock, 1990). In contrast, from the 'social shaping' perspective, it has been argued that the constructivist approach gives insufficient recognition to the interaction between local interest groups and wider social and historical processes (Russell, 1986). Perhaps the most comprehensive comments in this vein come from Mackay and Gillespie (1989), who wish to synthesize some aspects of social constructivist and neo-Marxist approaches. Taking the personal computer as an example, they emphasise both its diversity of deployment and the active role of users in shaping its applications and perceived meanings. In general terms, they conclude that:

"technologies offer varying possibilities for appropriation by users in ways which differ from the intentions of designers. Such possibilities, however, are not limitless: some technologies are more 'open' than others and some more 'closed'; they are more restricted in the range of possible uses to which they may be put by

their user... Thus one comes to recognise the social forces in front of the technology, not only those behind it; the technology can be seen as constituting a site on which a number of forces converge."

(Mackay and Gillespie, 1989, p. 35).

Fleck et al (1989) similarly develop the analyses of the social shaping of technology initiated by Mackenzie and Wajcman (1985, discussed in the Introduction). Fleck et al criticise the concept that technologies pursue given 'trajectories'; instead, they emphasise the processes of negotiation, conflict and redefinition which can occur both during design and during implementation and use. As Sonia Liff points out (1990), this paper is one of the few in the area in which gender issues do surface, in connection with the ways in which dedicated wordprocessors were initially designed to reflect and accommodate conventional, gendered divisions of labour in the office. However, as Liff adds, gender is only discussed in relation to wordprocessing, not in those sections of the paper which address robotics and Computer Aided Production Management (CAPM). Nevertheless, the paper does outline the interesting ways in which gendered divisions of labour and perceived technological possibilities interact, now that dedicated wordprocessors have begun to be superseded by multi-purpose personal computers (this argument is developed further in Webster, forthcoming, see Chapter Ten).

Another theoretical perspective, and one with increasing

prominence, is 'actor network theory' (Callon et al, 1986; Latour 1987). This focuses on the inter-relations between human actors and technologies (also seen as actors): *"the 'objectivity' of an item of scientific knowledge, or the technical capacity of a particular technological arrangement, is the upshot of the strength of alliances between actors."* (Murray and Woolgar, 1990, p.13). In this perspective, drawing on Foucault's work, power is conceived as relation, not as object or property - and as a relation which has positive (enabling) as well as negative (coercive) aspects. Coombs et al (1991) provide a recent example, in their analysis of the use of IT in budgeting and management processes within the UK National Health Service.

For research into HCS, the important, common element here is the focus on the ways in which social and technological processes interact, as some systems and practices gain acceptance and others fail. Building on the critiques of technological determinism initiated by Mackenzie and Wajcman (1985) and others, there is now a range of debates and attempts to develop alternative accounts. These also offer opportunities for the integration of gender perspectives. For example, examining the ways in which 'technical' and 'organisational' processes and artefacts are defined, rather than taking these as given, offers opportunities to question the ways in which each term reflects gender connotations. That is, there are opportunities to follow up the critiques developed by Linn

(1987), McNeil (1987) and others. But to date, these opportunities have yet to be followed up within what is regarded as 'mainstream' sociology of technology, as Liff has shown.

So far, the most substantial, interdisciplinary literature on gender and IT has been initiated largely outside the UK. This has been reflected in contributions to the series of conferences on 'Women, Work and Computerisation', held every two years since 1984 under the auspices of IFIP (the International Federation for Information Processing).

At the first conference, in 1984, most contributions came from Europe and Scandinavia; the emphasis was on empirical accounts of new IT applications, and to some extent on innovative information systems development projects addressed to women (Olerup et al, 1985; two sample projects are discussed in Chapter Four). There was one brief paper from the UK, which took a pessimistic view of the prospects for such innovative developments in the British context (Phillips, 1985).

Later conferences came to include more sustained theoretical reflections. Suchman and Jordan, for instance (in Tijdens, et al, eds., 1989) examined processes of technological change in relation both to childbirth and to clerical work. In both contexts, they found a tendency for the 'local', experience-based knowledge of women to be displaced in periods of technological change, by less

appropriate forms of expertise for which male technologists were able secure 'authoritative status'. By 1991, a still broader range of conference contributions were beginning to reflect the perspectives in sociological studies of technology referred to above. Susan Leigh Star, for instance, has suggested that actor network theory usefully allows us *"the power to think it (technology) might have been otherwise"*. In her view, this approach can provide a framework for articulating the insights women can develop as simultaneous 'insiders' and 'outsiders' in relation to technology (Star, 1991, p.87). This recent set of research initiatives largely represents work which has taken place over the same period as the case-study research described in Chapters Six to Nine, and some areas are still 'work in progress'. Accordingly it is relevant to draw some comparisons, and I return to this in Chapter Ten.

From a gender perspective, Cockburn has provided a recent overview of the ways in which social science analyses of technology are developing (1990). Her point of departure is the outcome of her own detailed research, discussed earlier in this chapter:

"Technological competence in particular has been assumed into masculinity and this, as much as employers' labour market practices, makes most women, seeking an adequate femininity, positively choose not to do technical training and work."

(1990, p.5).

Cockburn then goes on to outline the ways in which concepts of culture, identity and text have made their way into social science analyses of technology. 'Culture', here, no longer denotes 'the intellectual side of civilization' of the OED definition; instead, it has become " *'a constitutive social process, creating specific and different ways of life'*" (Raymond Williams, cited in Cockburn op.cit., p.7). This perspective has facilitated the creation of a 'new language' in which to speak about subjectivity - that is, new ways to tackle the area identified as a weakness within structure-oriented analyses such as Labour Process theory (Knights et al, 1990; discussed at the end of Chapter One). Cockburn moves on to summarise the ways in which technology has been understood as language and text, by post-structuralists such as Lacan and Foucault. In this view, subjectivity is seen not as fixed but as an effect of discourse. Cockburn notes the ways in which post-structuralism "privileges language"; she herself retains her own concern to analyse relations of power at a range of levels: "we could say that in the technological discourse of consumption, production and reproduction, women are hailed as one kind of human being, men as another - and in that difference are inscribed relative powerlessness, relative power." (Op. cit., p.10). She concludes with an acknowledgement of Donna Haraway's use of the 'cyborg' concept as a way of challenging easy and misleading oppositions between nature and culture, people and technology:

"If you took away my glasses, my pen, my telephone, wordprocessor, cooker and car, let alone the medical, nutritive, transport and communications systems to which these connect me, I would not be identifiable as the person I am. The subjectivity of everyone in industrialised societies, man or woman, engineer or childminder, is a technological subjectivity."

(Cockburn, op.cit., p.11).

In this context, Cockburn's distinctive concern remains to identify ways to "uncouple technology and domination" - and in this enterprise, she argues that women need to develop technological competence as one key strategy. Gaining recognition for existing women's skills, and arguing for broader definitions of 'the technical', then, are seen as important but not sufficient.

From a gender perspective, then, recent developments in the sociology of technology are encouraging. Whether feminists choose to adopt an 'actor network theory' framework, or an emphasis on the social shaping of technology, there is scope (albeit largely implicit) to explore the ways in which technological competence has been "assumed into masculinity" - and potentially to construct alternative practices. Feminists are making creative use of these opportunities: analysing technology as text in order to describe the ways in which women have been excluded, for instance (Benston, 1988), or mapping out the ways in which gender boundaries and associations

are shifting in relation to personal computers (Haddon, 1988; Webster, forthcoming).

For HCS research, the literature reviewed here provides some important theoretical starting-points and questions. Firstly, it underlines the importance of addressing technology as process, not simply as product or artefact. A human-centred approach, then, needs to develop appropriate design practices; it cannot be inscribed or guaranteed within a particular database structure or screen layout, although these should reflect the experiences and skills of the designers and users involved. Secondly, the ways in which technologies are 'socially shaped', interacting with their contexts, are complex: influences range from large-scale patterns of 'male tenure' to specific conflicts or priorities within a single organisation. Thirdly, opportunities exist to intervene in the 'discourses' or sites represented by technological developments - but these are variable, depending upon the scope and history of particular technologies.

These three points all indicate that scope exists for human-centred information systems design approaches in general, and for them to incorporate gender perspectives too. However, the research summarised in this section is still at an early stage; studies of software development practices are only just emerging - and in the UK, to date, none has consistently adopted a gender perspective.

Conclusion:

At the beginning of this chapter, I noted the uneven or underdeveloped level of existing research on gender and IT. In the broader context of literature concerning gender and technology, I identified and discussed four salient themes.

Firstly, it has been argued that women need greater access to technology-related work; in terms of IT, there is a current campaign to draw more women into computing. This has generated a degree of recognition for the extent of women's under-representation within computing. The disadvantages of the approach revolve mainly around its tendency to reproduce a view of men's working practices as 'the norm', and of women as outsiders who must adapt. In addition, it is somewhat dependent upon an appeal to employers' perceived skills shortages - which may prove short-term - rather than on a sustained argument for improved opportunities and employment practices.

Secondly, I reviewed literature in which science and technology are seen as having evolved almost entirely under men's control. This has contributed to new debates and developments within the history and politics of science; however, there has also been some tendency to invoke 'male' and 'female' attributes without examining or questioning how these have gained common currency. However, there is evidence to point to the complexities of men's experience of technology - their 'tenure' may be

seen as partial and contradictory, rather than secure.

Thirdly, it has been suggested, within the HCS tradition and elsewhere, that science and technology need the influence of 'women's values'. This argument opens up the possibility of gaining recognition for the existing skills and experiences of women, rather than suggesting that they must conform to patterns established in male-dominated contexts. However, these suggestions have not been followed up in any depth within HCS; in addition, they too leave open the danger of taking 'male' and 'female' values as given, rather than as historically and culturally variable categories.

Fourthly, I discussed research which has attempted to develop a 'feminist materialist' perspective. Through case-studies, the ways in which gender divisions are reproduced in relation to technology have been documented. Theoretical issues concerning the analysis of class and gender relations have also been raised. In this complex area, I suggested that a 'dual systems' approach appeared to be the one most compatible with initiatives in HCS within office work, offering a framework in which class and gender relations are seen as interacting, with neither taking precedence in a general sense.

Finally, I briefly discussed some recent contributions to sociological analyses of technology. A range of perspectives are evident in recent research on IT; these vary in emphasis, but share a common concern to

investigate the ways in which technological definitions and practices become socially established. They thus offer the potential for analysing the gender associations which Cockburn and others have documented, for instance in relation to masculine and feminine identities. This is one starting-point for new research in HCS. Others are firstly, the importance of focussing on technology as process as well as product or artefact, and secondly, the need to identify what kind of opportunities for user intervention exist, in specific contexts.

PART TWO: OFFICE INFORMATION SYSTEMS DEVELOPMENT:

METHODOLOGIES AND APPROACHES.

INTRODUCTION:

My aim in the two following chapters is to initiate a discussion of information systems development methodologies: that is, the sets of ideas, techniques and prescriptions to which systems analysts and designers have access - and which may influence them - in their professional training and practice. In Chapter Three, I examine three methodologies which do address the issue of user-involvement in design, and which are reasonably well-established, widely-used and representative of trends and practices in computing. What can these tell us, about existing opportunities and techniques for involving women clerical users in processes of office systems design? More broadly, what picture do they reflect of practices, controversies and trends within systems analysis and design - about the ways in which, using Mackay and Lane's term, systems analysts are engaged in "mapping the social world"? (Mackay and Lane, 1989 and forthcoming). Following these assessments, in Chapter Four I go on to examine similar issues in relation to a range of more recent systems development initiatives, which explicitly define themselves as interdisciplinary.

CHAPTER THREE:

USER-INVOLVEMENT IN SYSTEMS DESIGN:

THREE PRESCRIPTIVE METHODOLOGIES.

INTRODUCTION:

The issue of selecting appropriate systems development methodologies has become increasingly prominent, as both the commercial computing press and academic computer science literature have described long-standing and substantial problems associated with the design of large information systems. Hirschheim, for instance (1985), quotes a study by Mowshowitz (1976), who noted that in excess of 40% of information systems were failures. A study of the effectiveness of U.S. federal software projects found that, out of a total budget of \$6.2 million, under 2% of systems were used as delivered (US Government Accounting Office, 1979, quoted in the Introduction).

These figures echo the patterns evident in the 1990 and 1991 reports from the U.K. National Audit Office, cited in Chapter One. Other sources offer further confirmation: Hornby et al (1991) describe a 1990 survey by KPMG Peat Marwick McLintock, which found that *"two thirds of computer projects do not meet stated requirements and that 30% of the UK's biggest projects are over budget, over time, and if completed, fail to do the job they were designed to do"* (Hornby et al, 1991, p.1).

Hirschheim concludes that there has been a failure to

address the social or 'user' issues in systems development, and that this, rather than hardware or software difficulties, underlies the large numbers of failed or inadequate systems:

"The history of computing is rife with examples of computer systems which were introduced, only to find that they were not used because the social elements were not fully considered."

(Op. cit., p.228).

His view is supported by Willcocks and Mason (1987), who add many further examples (of which the most dramatic are the systems 'crashes' which took place in 1986 with the 'Big Bang' - the launch of major new information systems in the U.K. Stock Exchange).

Willcocks and Mason suggest that many systems analysis and design practices remain rooted in the early history of computing, when batch-processing, 'number-crunching' systems were developed for large-scale but fundamentally straightforward functions such as payroll. At this stage, the emphasis was on the devising of programmes to automate existing functions: processes of coding, testing and minor amendment, which left the practical initiative firmly with the programmer, not the users. In contrast, they suggest both that demands for information systems have concerned increasingly complex areas during the 1970s and 1980s, and that the context has changed: increasingly sophisticated software and hardware are available from

many sources and in many configurations, and users are becoming more knowledgeable, experienced and selective. With Land (1987), they therefore see a need for changing skills and perspectives in systems development:

"Land usefully distinguishes between traditional software engineering, and information systems engineering. The former has been primarily a technical task using formal methods and tools. The latter is a developing, much broader role, definable as assisting in the design and construction of information systems that enable an organisation to function more effectively. As such, information systems engineering relies on social processes, with communications skills, participative methods and judgement as essential features."

(Willcocks and Mason, op.cit., p.165-6).

Friedman and Cornford pursue similar themes in much greater depth, in their account of the history of, and current trends within, systems development (1989). They identify three phases in the history of systems development, each associated with specific constraints:

- (i) the 1950s and early 1960s, associated with hardware constraints: high costs, and capacity and reliability problems;
- (ii) the late 1960s, 1970s and early 1980s, associated with software constraints: low productivity of systems developers, difficulties of delivering systems on time and within budget;
- (iii) the 1980s and 1990s, associated with user relations

constraints - system quality problems arising from inadequate perception of user demands and inadequate servicing of their needs.

(Friedman and Cornford, op. cit., p. 59-60).

Friedman and Cornford emphasise that these phases can overlap, in specific contexts. In fact, observations such as Hirschheim's (above) would suggest that user relations issues may have been apparent during the 'software constraints' phase, although only constituting a fully-fledged 'third phase' from the mid-1980s onwards.

There is evidence to suggest, then, that the issues of user relations and user-involvement in information systems design are becoming increasingly prominent. From a gender perspective, it is particularly important to identify the range of opportunities and constraints concerning users, in relation to systems development - particularly since women are overwhelmingly defined as 'users' (or operators) rather than designers (as discussed in Chapter Two).

I now turn to the consideration of three systems analysis and design methodologies which illustrate diverging and reasonably well-established approaches to user-involvement: firstly, Structured Systems Analysis and Design (SSADM); secondly, the Sociotechnical approach; and thirdly, Checkland's Soft Systems methodology.

3.1 Structured Systems Analysis and Design Methodologies:

These are the methodologies associated with authors such as DeMarco (1978) and Gane and Sarson (1979). Versions in current use in Britain include 'LSDM' - Learmonth and Burchett Management Systems Ltd. Structured Development Methodology; and 'SSADM' - Structured Systems Analysis and Design Methodology. In 1983 the use of SSADM became mandatory in the Civil Service, and the methodology is also used widely in the NHS and in some local authorities.

Learmonth and Burchett's own 1986 "Introduction to LSDM (LBMS 1986) describes the methodology as *"based on a simple logical framework... taught to the developer as a prescriptive set of tools and techniques... although LSDM is not a magic recipe, it is, to a large extent, a 'cookbook' approach."* (p.8).

In this approach, systems analysis and design are tackled in six stages:

Systems Analysis:

1. Analysis of current system and identification of problems;
2. Specification of problems;
3. Selection of technical options;

Systems Design:

4. Logical data design;
5. Logical process design;
6. Physical design.

The approach is described as 'data driven', aiming to

provide three views of a system through standard forms of documentation:

- Data Flow Diagrams (DFDs), mapping the day-to-day flows of information through the system;
- Entity Models, mapping data stores, how they are accessed and the relationships between them;
- Entity Life Histories, showing how entities change over time, and what sequence of events the system has to deal with.

This section in the manual concludes (p.14) by emphasising the need to combine these three views of a system, and by pointing out that they *"are not created in isolation. Their development requires a lot of interaction with the users. The questions asked and the resultant knowledge gained are as important as the eventual products."*

At a more general level, the manual describes the advantages of a "good systems development methodology" as being:

- lessening the risk of wasting resources;
- improving eventual systems quality, in terms of documentation and appropriateness to user needs;
- providing *"a management window for reviewing project progress;*
- providing a *"communications base between all those concerned with system development";*
- facilitating planning processes.

In the context of clerical work, two issues are

immediately apparent here. Firstly, who are 'the users'? There is no explicit distinction in the methodology between senior managers responsible for purchasing and planning a new system, and the clerical workers who will use it on a day-to-day basis. Secondly, there is no discussion of the basis on which 'user' and analyst might collaborate. Despite the stated importance of "a lot of interaction with the users", there is no reference to the interviewing or communications skills required to elicit accurate information. In practice it is users at management level who feature in all the examples and lists of priorities in the manual; with the emphasis on productivity and project control during the development process, the issues of clerical involvement are not referred to.

More general points have been made by a number of computer scientists. Jayaratna (1986) distinguishes between 'analysis' (open-ended or exploratory consideration of a problem or a situation) and 'investigation' oriented to a presupposed computerised solution - and concludes that structured methodologies like LSDM only carry out the latter. Thus there is no scope for debate about the boundaries defining the situation, nor for recognising 'ill-structured' contexts, in which vague or conflicting priorities may have been expressed by prospective systems users. McCracken and Jackson have developed an overall critique of the 'life-cycle' model of a predetermined set of stages, which underlies structured methodologies,

comparing it to:

"a supermarket at which the customer is forced to provide a complete order to a stock clerk at the door to the store, with no opportunity to roam the aisles, comparing prices, remembering items not on the shopping list, or getting a headache and deciding to go out for dinner."

(op.cit., p.31).

They argue that systems' users' perceptions alter during the development process, and that methodologies can allow for this by including techniques for experimentation, and for parallel consideration of different problems and solutions - such as prototyping, for example (see for instance Greenbaum and Kyng, 1991, for further discussion).

Finally, others have placed these comments in a historical and theoretical context. Land et al (1983) link the emphasis on a 'life-cycle' model, and on the formal aspects of systems, to the influence of pre-existing software engineering methods. They see this form of approach as fundamentally inappropriate to situations (such as office work) characterised by complex relationships and by informal exchanges of information. Mike Jackson (1985) argues, at greater length, that so-called 'hard' methodologies such as LSDM have their roots in natural science models of reality, emphasising control and predictability, which - again - are inappropriate to social systems. Further, he argues that these methodologies imply a functionalist and deterministic view

of organisations and human behaviour: structure and consensus are assumed to be the norm, while change and conflict are largely ignored. 'Hard' systems design methodologies work, and remain in widespread use, not because there is a genuine lack of conflict, but because the methodologies can be imposed by the more powerful users, in their own interests (Jackson, 1985, p.140).

Willcocks and Mason (1987) make a similar point, placing structured systems design methodologies in historical context:

"The traditional systems development life cycle and the 'hard' systems paradigm are also essential parts of the inheritance. In practice, they impose serious limitations on the effectiveness of a computer system design. They imply the existence of a well-identified system ready for analysis, thus blinding the analyst to relevant events outside the very restricted definition given to 'information' and 'system'... 'Hard' systems thinking has dominated systems development. This means common agreement among analysts that reality is systemic; that is, made up of systems that can be identified and examined... Where conflict, disruption and lack of system exist, these are viewed as deviations from the norm, dysfunctional abnormalities that need to be eliminated."

(Willcocks and Mason, op.cit., p.73-4).

To some extent, advocates of structured systems analysis and design methodologies have confirmed the validity of

these points in their own responses to critical debate. Yourdon, for instance (1986) bases his defence of the structured approaches largely on a reiteration of its usefulness in project control, combined with an assertion of the improvements to be brought about by the use of increasingly sophisticated software: "expert systems to create expert analysts" (op.cit.p.138). This offers no response either to the general and specific points made by Land, Jayaratna and others, nor to the evidence of difficulties in systems developed cited at the beginning of this chapter. However, structured approaches remain important to consider, because of their widespread use; in Chapter Eight I provide an account of one such methodology in use, in a case-study context.

3.2 The Socio-Technical or Participative Approach:

This methodology has been developed in stages since the 1950s by Enid Mumford and a number of colleagues, many of whom have been associated with the Tavistock Institute. Mumford defines the approach broadly as "*involving users in the design of the systems which which they will eventually work.*"

This involvement is achieved through the work of 'design groups', facilitated rather than led by organisational and technical consultants. The groups report regularly to a managerial steering committee. Both the design groups and the design process may be defined in broad or narrow terms: either a group of secretaries reorganising their

own word-processing and clerical duties, for example (Mumford, 1983); or a group composed of representatives from a range of organisational levels, discussing work organisation and policy issues. Mumford identifies three general advantages in the participative method:

- (i) enabling users to get what they need out of a new system, by applying their own detailed knowledge which outside 'experts' would not possess;
- (ii) making more economical use of scarce and expensive 'expert' time, by devoting it to an advisory role in relation to user groups;
- (iii) reducing the likelihood of user resistance to change.

Key basic elements in this approach are, firstly, the stated aim of improving both productivity and job satisfaction; and secondly, the emphasis on setting common objectives before the design process begins. Mumford outlines eleven steps for the design group to follow, in moving from discussing the reasons for change, through analysing the current system, to selecting and implementing a new one. These are described in detail in "Using Computers for Business Success - the ETHICS Method" (1986). During this process, both technical and social practices and alternatives are to be considered, in order to arrive at the best 'fit' between the two.

The Socio-Technical approach does provide a way of responding to a number of the problems identified in

connection with structured methodologies. For example, there is less ambiguity about 'the user': final responsibility rests with management (via a steering committee), but Mumford recognises the importance of clerical workers' knowledge and skill, and acknowledges that diverging interests and requirements may surface during systems development processes. Secondly, it is not assumed that a computerised solution will be the sole or best outcome of the design process; and lastly, organisational aspects of the process - such as techniques for structuring group discussion - are addressed.

Mumford herself has acknowledged a number of the criticisms which have been made of her methods (1985). ETHICS is based on an assumption of fundamentally common interests shared by management and workforce, ignoring the incidence of strikes or other forms of industrial conflict. It has also been pointed out that Socio-Technical consultants are primarily associated with management, and accordingly tend to prioritise management concerns with productivity and with minimising 'user resistance'. Finally, Socio-Technical methods are mainly oriented towards day-to-day working procedures, rather than towards the more long-term and strategic levels of decision-making which determine major changes.

Mumford's own response to these points has been to state that the Tavistock Institute focus has been psychological rather than sociological, aiming to make work less

alienating for the individual (1985), and that these small gains should not be dismissed. However, this response does not resolve the fundamental problems highlighted by Kraft (1979) and by Land et al (op.cit.). Quoting from Mumford and Henshall's account of a participative exercise conducted at Rolls Royce in Derby (Mumford and Henshall, 1978), Kraft illustrates grounds for scepticism concerning the extent of the participation involved. Firstly, design group members were all selected by management; and secondly, the design group's recommendations were only accepted by management on an interim basis, pending the completion of more drastic restructuring processes. Land discussed a study by Hirschheim of some thirty UK organisations which had tried a participative approach; nowhere had the approach either been evaluated thoroughly, or adopted for general use. Land comments that this second point may have been due to the fact that the participative experiments had all taken place shortly before the study; *"or it may be because, despite its perceived success, the approach runs counter to the values and expectations of the EDP community."*

At best, therefore, the Socio-Technical approach would seem to offer well-informed managers the opportunity to introduce new IT systems with little overt disruption, at the price of investing a little staff time, and perhaps of tackling resistance from IT specialists. At worst, it has considerable potential for allowing participation to emerge on a very restricted or token basis, possibly by-

passing any existing trade union representation. Mumford's work is unusual, in the literature on systems analysis and design, in that it does include explicit discussion of participation processes involving women office workers. However, in keeping with the non-sociological perspective adopted, there is no general discussion of factors such as career structure in relation to gender and equal opportunities. Thus the approach does not provide a secure or consistent basis for women clerical workers' involvement.

3.3 Soft Systems Methodology:

This methodology has been developed by Peter Checkland and colleagues (Checkland, 1981; Checkland and Scholes, 1990). For different reasons, neither Structured Systems Analysis and Design methodologies, nor Socio-Technical approaches, explicitly address issues of scientific method or social theory. Instead they concentrate on outlining techniques, justified pragmatically in terms of project control (Structured approaches) or productivity and job satisfaction (ETHICS). Despite the differences between the two approaches, some critics have identified both as embodying a positivist model of the world (Jayaratna, op.cit).

In contrast, Checkland explicitly examines the history of science, and argues that 'hard' systems design methodologies are both inappropriate and ineffective in social situations. Instead he proposes a seven-stage

methodology:

- Stages 1 and 2: the analysis of the situation (not defined as a specific 'problem') and the expression of a 'rich picture' which includes differing perceptions among those concerned;
- Stage 3: the preparation of a number of 'root definitions', each seen as *"a concise description of a human activity system, which captures a particular view of it"*;
- Stage 4: the construction and testing of various conceptual models, embodying the changes seen as required when the 'root definitions' were developed;
- Stage 5: comparison between the conceptual models and aspects of the situation as described in Stage 2, through a debate between "concerned participants";
- Stages 6 and 7: agreeing on and implementing *"feasible and desirable changes."*

(Checkland, 1981, pp166 ff).

Checkland emphasises that these stages are not to be interpreted as a rigid sequence of instructions; they may be ordered, and repeated, as considered relevant in each case. His own examples illustrate that the process may result mainly in learning processes and in redefinitions of problems by participants, and that it can prove difficult to arrive at agreed "feasible and desirable changes". In one example quoted, Checkland comments that:

"the implications of the work were that structural changes to the organisation were required. Getting wind of this,

the Managing Director decreed that proposed changes must be procedural only."

(op.cit. p.182).

Checkland sums up his view of the difference between 'hard' and 'soft' systems design methodologies with another illustration:

"A RAND-type systems analysis of a weapon system will always produce a definition of a weapon system. Analysis using the 'soft' methodology might suggest disarmament, turning the other cheek, or political negotiation."

He concludes (op.cit., p.191) that the existence of different experiences and perceptions in any 'human activity system' are "the characteristic of the real world which forces the methodology to become a means of organising discussion, debate and argument rather than a means of engineering efficient 'solutions'."

In many respects, Soft Systems Methodology would appear to offer a sound basis for the development of user-involvement, in a 'human-centred' sense. The existence of different priorities and interests is acknowledged; ways of enabling different parties or 'stakeholders' to debate and negotiate are proposed. Yet Checkland himself comments that "in practice, defining changes which are 'culturally feasible' has led to rather conservative use of the methodology." (Op. cit., p.281).

For Checkland, "this is a matter of practice, so far, not

principle" (op.cit.,p.281). But indications that the issues are more substantial are provided by Mike Jackson (1982, 1985). Soft Systems theorists have succeeded in rejecting the functionalist emphasis on consensus and control which is implicit in Structured and in Socio-Technical approaches; instead, they adopt an interpretivist position, drawing on phenomenological social theory and hermeneutics. The emphasis is *"not on any external 'reality', but on people's perceptions of reality, on their mental processes rather than on the objects of those processes."* (Checkland, 1981, Chapter Eight).

Jackson argues that in this perspective, unconstrained debate between stakeholders is seen both as the means for achieving change, and as the criterion for validating the Soft Systems approach (1985, p.144). But such unconstrained debate could only take place among participants with equal access to power and resources: conditions not typical of most situations encountered by systems analysts, as some of Checkland's own examples illustrate. Jackson concludes that the interpretive, subjectivist approach taken by soft systems theorists does not enable them to develop analyses of the social structures within which both inequalities of power and individual 'world-view' are constructed. Therefore, the debate and the participation proposed by the methodology are vulnerable to remaining under the control of powerful stakeholders, obstructing any potential major change in the status quo (Willcocks and Mason develop a similar

view: op.cit., p. 78).

Checkland has acknowledged these points, but comments that *"it is the nature of society that this will be so,"* (1981, p.283); he considers that using Soft Systems methods can still be *"emancipatory for the actors concerned."* (op.cit.).

The Soft Systems methodology does propose a breadth of involvement and debate not envisaged in either the Structured or the Socio-Technical approaches; however, Jackson concludes by emphasising the need to distinguish between social systems in which conditions for 'unconstrained debate' do prevail (a small, community organisation, perhaps?) and those characterised by major inequalities in power, status and access to resources. He suggests that Soft Systems would be an entirely appropriate methodology in the former, but for the latter he proposes that new approaches be formulated, drawing on Habermas, and this is discussed in its own right in Chapter Four.

Discussion:

Three important, general points emerge from the above review of three systems analysis and design methodologies. Firstly, these methodologies cannot be seen simply as neutral 'techniques'; each reflects a specific view of scientific theory and practice, and of

social systems. Although these models remain largely implicit in the Structured and the Socio-Technical approaches, their effects can be observed in the practices recommended (LSDM), and in case-study accounts (ETHICS).

Secondly, all three methodologies emphasise the importance of user-involvement, for successful systems development and implementation. But none establishes a basis for involvement which can be unambiguously available to a wide range of systems users; they do therefore remain vulnerable to failure, in the form of incomplete analysis of a situation, or of conflict and dissatisfaction among users at the point of implementation. The Structured approach, for instance, addresses the manager as 'user', in practice, leaving aside issues of clerical skill, knowledge or job satisfaction. The Socio-Technical approach does acknowledge these points, addressing a wider range of 'users'; however, there are no safeguards to prevent token or manipulative forms of participation, in which the achievement of increased job satisfaction could be undermined by the emphasis on raising productivity. Soft Systems approaches also run the risk of promoting manipulated or constrained forms of debate and participation, by underestimating the nature and the significance of conflicting interests between 'users' or stakeholders.

Thirdly, the Structured and Socio-Technical methodologies generally treat the categories of knowledge, skill and

experience as given or unproblematic. However, the literature reviewed in Chapters One and Two demonstrated how strongly all three are shaped and perceived in ways which reflect power relations - including those of gender. In addition, Human-Centred Systems research has drawn on analyses of tacit skill and knowledge (Polanyi, 1967; Wittgenstein, 1963) to suggest that there are always aspects of work which cannot readily be computerised (see Introduction and Chapter Four). In the context of clerical work, therefore, this is likely to result in substantial areas of informal knowledge and communication remaining invisible to the uncritical systems analyst (Goranzon, 1982; Goodman and Perby, 1985; Murray, 1986).

Lastly, the terms in which these methodologies are commonly described and compared provide an interesting reflection of dichotomies which have strong gender associations in Western cultures. The 'hard' methodology - SSADM - is the one which situates itself most clearly within engineering traditions, stressing logic, rationality and control: values which have become strongly associated with masculinity, in Western cultures. The term 'soft systems' is used to refer to a methodology for analysing situations which lack clear structure and definition, thus requiring the social skills of communication and negotiation - often (though not exclusively) associated with femininity. Thus the focus is on an opposition between 'hard' and 'soft', rather than on interdependence (c.f. Linn, 1987; and Greenbaum, 1987, discussed in Chapter Four).

Many recent research publications illustrate a continuing preoccupation with design methodology and with user-involvement, in computer science. Avison and Wood-Harper, for instance, suggest that it is unrealistic to search for one systems development methodology to deal with increasingly diverse organisations and requirements. They propose a 'Multiview' approach, using elements of all three of the methodologies reviewed above, and adding prototyping techniques. Soft Systems would provide guidelines for the initial analysis phase, for example, while Structured-style functional decomposition would be used in information modelling, followed by using Socio-Technical methods to consider user requirements in their organisational context (see also Avison and Fitzgerald, 1988). But this approach tends to minimise differences between methodological approaches, treating them as neutral techniques instead: both the theoretical and the practical difficulties referred to above remain to be addressed.

Land et al undertook a thorough survey of systems development approaches, as part of an EC-funded study of social control (1983). They comment that *"only slowly is it dawning on systems designers that the success of a computer system cannot be assured if it is not acceptable to its users"* (p.161). They add that existing research has tended to concentrate either on ergonomics from the individual point of view, or on what they call the economic effects of IT; little attention has been paid to

the quality of jobs and of working environments, particularly in the UK.

On the basis of their own case-studies, Land and his colleagues emphasised that further research is needed to examine how factors such as management goals and styles, trade union policy and systems development methodologies interact. They regarded participative and experimental design approaches as *"most likely to lead to the introduction of satisfactory systems... there is strong evidence to suggest that more conventional approaches are based on inadequate models of organisational realities, and can result in the introduction of degrading systems."* (op.cit., p.225).

Finally, Friedman and colleagues surveyed attitudes and experiences among managers in data-processing departments in the UK, US and Europe in the early 1980s (1984, 1985). They point out (1985, p.204) that it is rare for 'textbook' methodologies to be adhered to rigorously. Although patterns varied between the countries studied, they detected a general shift towards more flexible patterns of systems development. For example, more managers were seeking to recruit computing personnel with 'generalist' backgrounds, such as Arts or Humanities degrees; integrated analyst-programmer posts, and team-based work, were on the increase - breaking down some of the boundaries between low-level programmer posts and those with more scope for creativity; and there was

increased evidence of 'user-involvement' - largely at management level, except in Scandinavia, where unions' creation of 'data shop steward' roles had established broader forms of involvement.

Friedman et al identified a combination of economic and political factors as having contributed to these changes, including pressure both from trade unions and from computer-literate managers; they also cited the falling cost of computer hardware, and the increasing availability of 'Fourth Generation' software languages, facilitating user'designer collaboration through prototyping techniques. This last point was emphasised in a report sponsored by the Institute of Data Processing Management in 1986:

"Most of the principles of systems development built up over the years would have to be abandoned to use 4GLs effectively. The idea of the 'system life cycle', for example, with its set stages... is not suited to 4GL work: 'We found it was frequently replaced by a continual process of incremental development in which the... stages become indistinguishable from one another...' '... the users of computer systems will be less beholden to experts and will become responsible for their own systems development.'"

(Reported in the Financial Times, 20.11.86).

In Chapter Six, I return to the issue of 4GLs in systems development, in the context of a case-study example.

Conclusion:

At the beginning of this chapter, I noted an increasing concern within computing, about reportedly high rates of failure and difficulty associated with large-scale information systems. Recent research has suggested that a failure to address 'social factors' in systems development underlies these patterns, and that the current phase of computer systems development is characterised by 'user relations' constraints, more than by hardware or software constraints. The question of identifying systems analysis and design methodologies which can successfully promote user-involvement is an important and topical one, therefore. It is also important from a gender perspective, since women are largely defined as the users of systems rather than their designers. It is important to examine whether an increased focus on 'user relations, in computer science, can offer new opportunities to analyse - and perhaps improve - women's experience of office computerisation.

A review of three prominent methodologies indicated a number of problems, however, which prevent them from establishing a secure basis for user-involvement in general, or for women clerical users' involvement in particular. 'Structured' approaches tend to reproduce the narrow, technicist focus associated with the early phases of computing, marginalising or rendering invisible user concerns and organisational complexity. In practice, the 'users' represented here (and only partially) are managers - although this remains implicit. The Sociotechnical

systems methodology offers a far more comprehensive approach to user-involvement, recognising the existence of different parties, and proposing a range of specific techniques. However, again the emphasis here remains with management; it is assumed that the goals of increased productivity and increased job satisfaction can be pursued without substantial conflict. Lastly, Checkland's Soft Systems methodology does address both the issue of how systems development problems and boundaries are defined, and the existence of different and unequal 'stakeholders' within organisations. He relies, however, on the resolution of differences through 'unconstrained debate', in a form which could not easily transpire in most conventional organisations.

In more general terms, I also noted that the language in which these methodologies are commonly described and compared reproduces a familiar gendered dichotomy: 'hard' techniques - logical, controlling - are contrasted with 'soft' skills like communication, rather than the two being seen as interdependent.

In conclusion, some general surveys and studies were summarised. These indicate both that formal methodologies are rarely adhered to thoroughly in systems development, and also that there are trends towards greater flexibility and variety of approach, in terms of the recruitment and the practices of systems developers. These themes are considered again in Chapter Four, in connection with recent interdisciplinary initiatives.

CHAPTER FOUR:

User-involvement in Design: Interdisciplinary Approaches in Britain and Scandinavia.

Introduction:

With the exception of Structured design methodologies such as SSADM, the approaches reviewed in the previous chapter all indicated a need to bring to bear both social science and computer science perspectives in the process of designing office information systems. This general view is reiterated in the report from a workshop organised under the auspices of the EC 'ESPRIT' project:

"To the extent that human factors have been considered in systems design, the prime concern has been the individual and the support of his/her tastes. A characteristic of the IT research and development has been the lack of consideration for the group and for the organisation as a social system, let alone as a social entity... So far the only group of social scientists who have been properly integrated into IT R and D has been the psychologists, with the notable improvement in human-computer interaction... It is conceivable that drawing upon the competence of other groups of social scientists (e.g. anthropologists, organisational behaviourists and work sociologists) would mean that significant improvements could be achieved in IT support of work-groups." (Bjorn-Andersen et al, 1986; see also Bjorn-Andersen, 1988).

There is, then, an increasing concern to develop and strengthen interdisciplinary perspectives on systems development. In this chapter, I propose to discuss three relevant areas of existing research:

(i) Two contrasting, British evaluations of the ways in which social theory might contribute to information systems development

(Hirschheim, 1986, 1987; Jackson, 1982, 1985).

(ii) A range of interdisciplinary projects in Scandinavia, including the Scandinavian 'Collective Resource' approach (Olerup et al, 1985; Ehn, 1988);

(iii) The main features and achievements of Human-Centred Systems research in the U.K. (Rosenbrock, 1989; Gill, 1990).

4.1 Social Theory and Information Systems Analysis and Design:

Hirschheim (1985) reviews existing approaches to office systems design in some detail, relating the many problems encountered in systems development to the failure to consider "the social elements". Broadly, he suggests the adoption of a sociotechnical approach, although his discussion goes further in some respects. For instance, he proposes the adoption of Land's distinction between three categories of participation, in ascending order of scope and significance: 'consultative', 'democratic' or 'responsible'. He proposes to move beyond the

sociotechnical approach developed by Mumford in two further respects:

(i) the adoption of a 'Multiview'-type combination of methodologies and techniques: Checkland's methodology would assist with analysis, for instance, and Mumford's techniques with detailed design processes (Hirschheim, 1985, p.280-1);

(ii) reference to a number of traditions in social theory, in order to analyse the office as a social system: not only the interpretive tradition used by Checkland, for instance, but also psychoanalysis (associated here with Erich Fromm) and the critical social theory of Habermas (op. cit., chapter seven).

Hirschheim discusses this explicitly pluralist approach in a 1987 paper which draws together some of the different strands. He matches what he sees as the four main trends in information systems development with the four paradigms in social theory identified by Burrell and Morgan (1979). Each is presented as a story, with key actors, narrative and plot:

(i) *'The analyst as systems expert'*: that is, long-established approaches such as SSADM, working within a functionalist paradigm;

(ii) *'The analyst as wise man or change agent'*: that is, soft systems, working within an interpretivist paradigm;

(iii) *'The analyst as labour partisan'*: that is, the

Scandinavian 'Collective Resource' approach, informed by labour process theory and working within a radical structuralist paradigm;

(iv) *'The analyst as emancipator or social therapist'*: that is, trends illustrated only within research literature to date, but proposing to incorporate some elements of all the three preceding approaches, working within a neohumanist or radical humanist paradigm. (See for example Lyytinen and Klein, 1985).

Like Land et al (op.cit.,) Hirschheim concludes that current information systems development practices remain most strongly influenced by the functionalist paradigm, and that *"the price of the practical monopoly of functionalism is an increased failure rate of IS implementation, due to complexity denial."* (1987, p.15). He argues for *"a radicalized contingency approach (which) conceptualises situations from different paradigmatic perspectives and looks for a best fit of development approaches which draw on incompatible theoretical foundations."* (Op. cit., p.15).

Mike Jackson's starting-point is the critique of both 'hard' and 'soft' methodologies which has been summarised in Chapter Three. Concluding that Soft Systems is the best approach *"in those many social systems... in which there is a rough balance of power and resources between different stakeholders"*, Jackson goes on to consider Habermas' work as a possible basis for a 'critical'

systems approach in situations of significant inequality. (1985, p.146). He describes Habermas' work as aiming to complement or extend Marxist analysis of the economy with an analysis of language and ideology, and he quotes Habermas' own summary of key processes:

"'... the formation and extension of critical theorems, which can stand up to scientific discourse, the organisation of processes of enlightenment, in which such theorems are applied and can be tested in a unique manner by the initiation of processes of reflection carried on within certain groups towards which these processes have been directed; and the selection of appropriate strategies, the solution of tactical questions, and the conduct of political struggle.'"

(Habermas, 1974, quoted in Jackson, op.cit., p.146).

The testing of theories, by the social actors addressed. is compared to psychoanalysis:

"the analyst's success is measured by the extent to which the patient recognises himself/herself in the explanations offered, and becomes an equal partner in the dialogue with the analyst."

(Op. cit., p.148).

Such an equal role is the precondition for 'undistorted communication' and for the discussion of possible strategies. To achieve it, actors may have to struggle politically against powerful opponents who are reluctant to make concessions. Jackson concludes by proposing that detailed work be done in order to develop and apply

Habermas' three functions, in the form of a critical systems methodology appropriate for use in situations characterised by conflict and inequality.

Jackson and Hirschheim, then, demonstrate the problems raised for information systems development processes by the dominant 'functionalist' paradigm. They share a commitment to developing alternatives on the basis of some form of critical social theory. However, where Hirschheim proposes a 'pluralist' or 'radicalized contingency' approach, combining perspectives which have incompatible theoretical starting-points, Jackson prefers a clear-cut distinction between situations appropriate for 'Soft Systems' analysis, and those requiring a 'critical' approach. Both see their views as preliminary, and in need of further elaboration. A number of points may be raised, in evaluating them both.

Firstly, there is the question of matching a methodology to a situation. Both Jackson and Hirschheim suggest that a decision has to be made about the organisation or situation being considered. For Jackson, the main issue is whether or not a 'rough balance of power and resources' exists. Hirschheim provides a range of examples, in his outline of the radicalized contingency approach. Functionalism (structured approaches) could be appropriate for what he describes as predominantly technical, "engineering-type" applications, such as air traffic control. Social relativism (Soft Systems) would be appropriate for situations involving 'social factors' with

no obvious technical solutions, such as budgeting. Radical structuralism would apply where there is a power struggle between workers and management. Neohumanism would be appropriate where there are value conflicts, but also "a willingness to resolve the issues by informed debate." (1987, p.15; Hirschheim gives no illustrations for the last two paradigms).

There is an unresolved, implicit problem here. Initiative appears to remain in the hands of the analyst, in terms of defining an organisation and a 'problem' within either Jackson's or Hirschheim's terms. Yet, it is questionable - bearing in mind the research reviewed in Chapters One and Two - whether any organisations present either unambiguously 'technical' problems, or relationships based on a rough balance of power and resources. This would not invalidate Jackson's approach in principle; in fact, it could be seen as more widely relevant than he claims, for instance if it could be developed to address gender issues as well as labour/management ones. But Jackson does not address the issue of how the analyst himself/herself can or should act, in entering a complex organisational situation. Should he or she explicitly act as the advocate of the least powerful stakeholders? Or maintain a facilitating role, avoiding over-identification with any particular party if possible? What techniques might be adopted in order to pursue either position? Clearly, much remains to be acknowledged, and then clarified, in Jackson's approach.

Equally fundamental problems arise in connection with Hirschheim's proposals, which remain vulnerable to the weaknesses associated with the Sociotechnical, Soft Systems and Multiview approaches (see Chapter Three). This is illustrated in sections of Hirschheim's discussions of office systems design (1985). Here, although he gives both moral and pragmatic reasons for supporting participative approaches, the emphasis always tends to drift towards the pragmatic ones, with the associated risks of implicit managerial bias:

"... true participation is the most likely way to ensure that full support of the users is obtained, thus lessening any prospect of sabotage, resistance, avoidance or other dysfunctional behaviour."

(Op. cit., p.175).

However, in the case of an information system which may be associated with potential job loss or long periods of VDU use, 'resistance' is only dysfunctional for the manager, not the end-users. Or again, describing the outcome of a workshop exercise, in which participants had adopted different 'user' roles regarding a hypothetical office automation project:

"Unfortunately, the clerk's presentation fell on deaf ears... these insights led to a commonly-recognised need for the development of conflict-handling methods and management strategies which would minimise the destructive side-effects of conflicts about technology."

(Op. cit., p.267).

At a more general level, it appears that the 'radicalised contingency' approach, like Multiview, tends to reduce information systems methodologies to implicitly neutral techniques. The existence of 'incompatible theoretical foundations' is acknowledged, but no consistent framework is adopted within which to analyse organisational processes. The clerk's lack of success (in a workshop exercise or in a real organisation) appears as 'unfortunate', rather than as a feature of identifiable social and organisational relations.

Secondly, there are issues in relation to gender. Hirschheim (1985) does provide a short historical overview of the emergence of office work, in the context of the industrial revolution. But its significance as an area of women's employment remains unacknowledged. The one indexed reference to women - "*women, emancipation of*" - turns out to be a neat example of technological determinism: while economic and political factors are ignored, the typewriter is seen as having made a significant contribution to improving women's status.

For Hirschheim and for Jackson, issue of power, inequality and conflict are all conceived in terms of labour and management; the sexual division of labour is not seen as relevant. In the office context, this weakens their approaches in two respects. Firstly, there is the danger that important areas of skill and communication will be ignored or underestimated, because of their

gender-associated low status. Secondly, there is the danger that situations characterised by entrenched occupational segregation, along gender lines, will be wrongly assumed to be free of conflict and inequality.

I now turn to some examples of interdisciplinary research in Scandinavia, in which a number of the points raised so far, in this chapter, and in the preceding one, have been addressed.

4.2 Interdisciplinary Research in Scandinavia:

During the 1970s and 1980s, extensive research has been carried out in Scandinavian countries into interdisciplinary approaches to systems analysis and design. In their most developed forms, these initiatives have contributed to what is known as the Scandinavian 'Collective Resource' approach (Bjerknes et al, 1987; Ehn, 1988). Comparable research is not yet established on a wide scale either in the U.K. or in the U.S.A.; it is important, therefore, to examine the main features of this Scandinavian research, and to consider how it may contribute to developments in human-centred systems research in the U.K.

4.2.1 Key Features of Scandinavian Research:

Firstly, the political and industrial relations context has been significant, in facilitating interdisciplinary systems development initiatives in Scandinavia. Pelle Ehn and Morten Kyng identify three particular features:

- " - high levels of unionisation;
- strong national labour federations;
- centralised negotiation systems;
- large social democratic parties with strong links to the national federations of blue (and some white) collar workers, parties which for long periods have led governments;
- positive attitude to new technology from the central trade union federations, at least since World War Two, based on the assumption that jobs lost by introduction of new technology would be compensated by active labour market policies from the government (but some opposition at local level)."

(Ehn and Kyng, 1985, p.2).

In this context, legislation has been passed, establishing a basis for some forms of industrial democracy - such as company assemblies in large companies in Norway, one third elected by employees and two thirds by shareholders.

Large research projects were established during the 1970s, to look into the relationship between democratic planning, control and use of computers: the NJMF project in Norway, DEMOS in Sweden and DUE in denmark. The UTOPIA project (described below) was initiated as a response to the problems and the limitations perceived by researchers and by trade unions in connection with this first group of projects.

These research initiatives explicitly aimed to develop

trades union perspectives on new technology and work. However, they also drew on resources from government funds and research institutes; their outcomes included the following:

- data agreements (new technology agreements) allowing for employee access to information and for the election of data shop stewards (NJMF, Norway);
- the development of a negotiation model for independent trade union investigation, as a basis for union participation in management projects (DEMOS, Sweden);
- the production of reports and teaching materials, based on surveys of local unions, and the establishment of local working groups (DUE, Denmark).

Thus the aim was to strengthen the basis on which union members could discuss new technology and conduct negotiations with employers. The UTOPIA project broke new ground by exploring union and worker perspectives on systems development, rather than use and implementation, and was based on commitments to enhance the quality of work and of products, and to promote democracy at work.

(Ehn and Kyng, op.cit.).

Hirschheim places this approach in his third category: the analyst as 'labour partisan', in a context of opposed class interests, theorised according to a 'radical structuralist' paradigm (1987, p.10). He criticises it in general terms: firstly, for resting on unfalsifiable, unscientific propositions (i.e. that historical 'laws'

dictate the eventual emergence of socialism as a result of class conflict); and secondly, for producing dogmatic over-simplifications (e.g. assuming that no internal conflicts exist within management groups, or between workers and their union representatives).

In fact, a significant body of literature and research exists, demonstrating that the crude interpretation of historical materialism, on which Hirschheim bases his critique, is neither the only nor the predominant one to have been developed. This point is illustrated by the diversity of debate which has emerged within labour process theory (see Chapter One). At a broader level, it is illustrated by the intense debates of the 1970s, concerning class relations and the state (Gramsci, 1972; Miliband, 1973; Poulantzas, 1973), or concerning class and gender (Walby, 1986; Cockburn, 1986, 1991).

Further, the Scandinavian research itself is much more complex and diverse than Hirschheim suggests. Firstly, in many examples, the social democratic framework outlined above is taken as read; research concerns with job quality and worker participation are seen as legitimate within that context, rather than as strategies for intensifying class conflict. (See for example the accounts of empirical research contained in Bjerknes et al, 1987).

Secondly, many Scandinavian research projects have identified precisely the different trends in management and union strategies which Hirschheim expects to be

dogmatically ignored. Schneider and Ciborra (in Briefs et al, 1983), reviewing Norwegian experience, describe some unions as distinguishing both cooperative and conflictual aspects of participation in decision-making: traditional negotiations over perceived conflicts of interest are not undermined by periods of detailed cooperation in system design, nor do they preclude these. Kubicek, writing in the same volume, comments on management's increasing requirements for flexible, decentralised information systems:

... systems of this type cannot be designed successfully by centrally-located systems designers... the users' knowledge and their motivation thus become an economic factor for management and in addition open a new base of influence for the workers."

(Kubicek, op.cit., p.62).

Thirdly, a detailed consideration of models of skill and knowledge has been an important theme in much Scandinavian systems development research. While this has referred to the issues of control and degradation discussed in Chapter One, it has also been informed by research in philosophy, linguistics and gender theory.

For example, Goranzon et al (1982) propose a distinction between theoretical or 'propositional' knowledge and 'knowledge by familiarity', based on Wittgenstein. They argue that current approaches to computerisation only recognise the former, often resulting in a deterioration in the quality of systems and of jobs and service

provision. Lie and Rasmussen (1985) and Goodman and Perby (1985) similarly emphasise the importance of tacit skills and informal communication, this time in the specific context of women's clerical work. They argue that such skills are currently undervalued partly because they are seen as 'natural' feminine attributes (c.f. Gaskell, 1987, and Cockburn, 1985, discussed in Chapters One and Two).

Ehn (1988) has provided the most comprehensive discussion of the Scandinavian Collective Resource approach. This places in context the projects in which Ehn played a significant part during the 1970s and 1980s (notably the UTOPIA project, see below) and roots them in what he sees as a creative interplay of different perspectives. In general, his aim is to provide a critique of, and develop alternatives to, the Cartesian, rationalist model which underlies conventional systems design methodologies such as SSADM.

From Heidegger, Ehn takes concepts which he finds useful in theorising the process of designing computer artifacts: that is, the tension between the need *"not to break down or make obsolete the understanding and readiness-to-hand the users have acquired"* in existing daily practice, and the equally important need *"to break down the understanding of the already existing situation and make it present-at-hand, ... to make reflection about it possible, and hence to create openings for a new understanding and alternative designs"* (op.cit, p.77). That is, there is a tension between 'tradition' and

'transcendence', which needs to be addressed in processes of systems development.

From Marx, Ehn takes an emphasis on practice in a different sense: *"compared to a Heideggerian approach, everyday practice is still the point of departure... but now emphasis is on transcendence of the given as emancipatory practice... A design process and methods that support the users to emancipatorily transcend the given practice comes into focus."* (Op. cit, p.85).

From Wittgenstein, Ehn takes the concept of language-games, which he finds especially appropriate to the labour-processes of design and use in relation to computers: *"I see the Wittgensteinian notion of language-games as a most fruitful elaboration of understanding human practice as the product of, and the same time producing, the world and our understanding of it... I also find it striking how much Wittgenstein's view of language resembles the view of artifacts in general in the Marxist design approach. Being social, as the product of others, and as something we use to change the world, ourselves and our understanding of it, language is not only as expression of social relations, but contains them"* (op.cit., p. 109).

Ehn cheerfully concedes that his use of these three philosophical traditions is quite instrumental and specific, oriented towards generating innovative design practices. He is well aware of the contrasts between "a

philosopher that found the conditions for human existence once and for all given, another who saw philosophy as a way 'not only to explain the world but also to change it', and a third one that tells us that philosophy 'leaves everything as it is' " (p. 125). However, having made these tensions and contrasts explicit, he leaves his readers - quite appropriately, I think - to arrive at their own assessments of the outcome in terms of reflections on, and methods for, systems design. And he identifies two central tensions or contradictions in the process of systems design. Firstly, the contradiction between tradition and transcendence, noted above: should a wordprocessor be designed as a traditional typewriter, or should the aim be to visualise new processes and new tools? Should a new library information system support traditional services, or prioritise new ones, and perhaps new users? (Op. cit., p.129). Secondly, the contradiction or conflict between democracy and skill: designing for democracy at work requires both professionals and users to articulate and share skills and knowledge - and yet, from a philosophical point of view, skill and knowledge are understood as including important and necessarily tacit aspects. The 'design by doing' approach, outlined below, provides a response to both these issues.

4.2.2 Examples of Recent Scandinavian Research:

The 'UTOPIA' Project:

In Scandinavian languages, UTOPIA is an acronym for 'training, technology and products from the quality of

work perspective'. The DEMOS, DUE and NJMF projects had led to a recognition among researchers and trades union participants that intervention in the design both of technologies and of working practices was necessary, in order to influence the quality of jobs and of services. UTOPIA began in 1981, involving computer scientists, social scientists and graphics workers, with the support of the Nordic Graphic Workers' Union. The project ran for four years, and involved some fifteen people, on average, largely on a part-time basis.

UTOPIA aimed to develop alternative technologies, working practices and training approaches. In particular, the aim was to draw up a requirements specification for graphic workers to use in negotiations with newspaper companies, and to develop computer systems and workstations for newspaper page make-up and image processing. Over this, the project cooperated with the Swedish state-owned printing concern Liber.

In terms of outcomes, the requirements specification was taken up by unions in collective bargaining, and also stimulated discussion among journalists and employers. The page make-up system was also taken up, although at the end of the project problems were evident: the unwillingness of employers to accept an evaluation of work organisation issues, and the influence on Liber of trends in the US market which were at odds with the aims of UTOPIA (Ehn, 1988).

In a more general sense, UTOPIA produced both examples of tools and techniques for the systems development process, and training materials which could be taken up in other contexts. Ehn and Kyng summarised the key principles which they felt had been identified as important during the research in some general "Theses on Design for Democracy and Skills":

- Design of computer support is design of labour processes;
- Labour processes cannot be reduced to information processes;
- 'Use models' (user-oriented conceptual models) are important in design;
- Hardware should be considered early in design, in parallel with software, not afterwards;
- Important aspects of labour processes - in relation to design of computer support - cannot be formally described;
- Professional experience with, and knowledge of, the labour process are important in the design process;
- Professional experience with, and knowledge of, computers are important when designing computer support for a labour process;
- Design should be done with users, neither for nor by them;
- Mutual learning should be an important part of the work in a design group (before detailed work on specifications, or design itself);
- 'Design by doing' is important: e.g. simulating screen

layouts and work processes with paper drawings and mock-ups. This enables 'tacit' or informal aspects of skills and processes to be included, and permits users to develop ideas without being constrained by (for instance) the technical limits of current prototyping approaches."

(Ehn and Kyng, op.cit.).

Women Clerical Workers in Denmark and Finland:

UTOPIA addressed itself to the skills and experience of an archetypally male-dominated, craft-based group of workers. Women clerical workers are much less strongly-represented than print workers, in Scandinavia as in Britain, both in trade unions and in research priorities. Nevertheless, contributions to conferences on Women, Work and Computerisation, organised by the International Federation for Information Processing (and discussed in Chapter Two), have included examples of research initiatives involving clerical workers. Two contrasting examples are summarised below.

(i) Women Office Workers in Denmark:

A computerised registration system was introduced into the Danish Directorate of Labour during 1981-2. The seventeen women directly involved produced a report describing their experience, and setting out a 'manifesto' for the introduction of computer systems. (Registry Department/Copenhagen Business School, 1982). Two women researchers who were also involved in this process reported their observations in a paper presented to the

first IFIP conference on Women, Work and Computerisation (Gronfeldt and Kandrup, 1985).

Gronfeldt and Kandrup set out to examine what a 'women's perspective' on information technology and systems development might be. For eight months following the introduction of the new system, they attended fortnightly group meetings with the women clerical staff at the Directorate of Labour. Drawing on the 'consciousness-raising' pattern of women's movement groups, they did not present themselves as external experts, but facilitated discussions in which group members analysed their experience, with some reference to technical reports concerning the system. At the end of this period, a group report was produced.

The immediate results were mixed: group members gained confidence and understanding, concerning computerisation, but they had to get a software engineer to 'translate' their report into computing terms before management or technical staff would take it seriously. Some of the women's immediate concerns were then addressed. However, Gronfeldt and Kandrup commented - echoing, from a different perspectives, the outcomes of the Rolls Royce participation exercise criticised by Kraft (1979):

"We were so absorbed in just making this particular system work better that it came as a shock to all the women when, by chance, they were informed that this system was only the start of a development towards the totally

automated office, where their work would be performed by professionals... We could not encounter this problem by just getting better in the technical field... the only way would be through the union. But the way we worked in the group did not ensure that long-range political aspects of new technology would be taken into account."

(Op.cit., p.216).

Gronfeldt and Kandrup reached more general conclusions in two areas. Firstly, in terms of systems analysis and design, they criticised existing methodologies both for inflexibility ('life-cycle' approaches) and for failing to address issues of power and conflict (Socio-Technical approaches). In their view, more radical approaches (i.e. the Scandinavian union/research institute collaborative projects) had tended to emphasise the concerns and values of male workers, and to ignore issues such as the relationship between paid work and family responsibilities. They suggested that a consciousness-raising approach could enable these links to be made; while not resolving the problems of conflicting interests within the workplace, or of long-term strategies, this could create a stronger basis for women to become involved in systems design or in union negotiations.

Secondly, in terms of 'women's research', Gronfeldt and Kandrup commented that while the documentation of injustices experienced by women is necessary, it can become a 'misery theory' - *"a type of research which helps*

us realise that girls always make the 'wrong' choice."
(op.cit. p. 206). To counteract this, they share Gaskell's conclusion (1987) - that the activities in which women already engage need increased recognition, rather than allowing all the emphasis to remain on expanding women's access to male-dominated areas.

(ii) Women Office Workers in Finland:

Vehvilainen (1986) pointed out that despite over ten years of Finnish research into user-involvement, women office workers rarely had the opportunity to influence systems development. Following Lie and Rasmussen (1985), she referred to the importance of caring, communications and organisational skills in office work, and to the tendency for these to remain invisible to, or taken for granted by, both managers and systems designers.

Adopting an approach which has also been used in Sweden, Vehvilainen established a 'study circle' of ten Finnish state bureau secretaries. The group met once a week over a six month period; members came from five different offices, each of a 'traditional' rather than a 'taylorised' type, although management styles varied as to their degree of formality.

Vehvilainen chose the study circle approach as a way of building on women office workers' experience of cooperation and group work (Ressner and Gunnarsson, 1986). Her aim was to build up the knowledge and practise the

skills office women need to develop their work, and the computer systems supporting it." (op.cit., p.2). To this end, she organised activities around three themes: firstly, an introduction to computer systems and to ways of evaluating them; secondly, analyses of members own work processes; and thirdly, the acquisition and implementation of new systems. Therefore group sessions were both tightly structured, in comparison with the Danish group described above, and also dependent on the skills and the input of Vehvilainen herself.

Vehvilainen found that all group members grew more confident about tackling systems development issues, over the study circle period; all had taken some form of new initiative, by the time the research ended. She concluded:

"The study circle has clearly fulfilled its purpose... the example and support of active members of the group has encouraged those in more subordinate positions to express themselves and to think about their goals. The study circle has shown that in proper conditions, office women can develop their work with EDP [IT] systems, and they make very realistic initiatives."

(op.cit. p.8).

4.2.3 Discussion:

The various areas of Scandinavian research summarised above have produced tangible results for the graphic and clerical workers involved:

- products (the UTOPIA workstation);

- specific systems development guidelines and criteria (the UTOPIA design theses and the Danish clerical workers' 'manifesto');
- experience of group-based involvement, leading to increased confidence and awareness (all three projects);
- some local improvements in the quality of jobs and of systems (all three projects).

From the point of view of interdisciplinary research into systems development, this Scandinavian research provides substantial responses to concerns about skill, job degradation, industrial relations and (less comprehensively) gender divisions. Firstly, it has proposed frameworks for analysing skill as composed of both tacit and articulated elements. Secondly, it has illustrated design approaches, methods and techniques which can preserve or enhance workers' skills. Thirdly, it has also focussed attention on economic, political and organisational factors which can undermine or limit processes of user-involvement and democracy at work. And lastly, albeit in limited and preliminary initiatives, it has proposed forms of involvement which encourage women's participation in particular, addressing the specific nature of their experience of information technology. In all these respects, the Scandinavian 'Collective Resource' approach has proved more comprehensive - in relation to the aims of Human-Centred Systems research - than the approaches being explored by Hirschheim or by Mike Jackson in the UK.

However, the Scandinavian research also raises a number of other issues which require careful consideration in the UK context. Firstly, the UK lacks the social democratic political and legal framework which has supported innovative approaches to IT in Scandinavia; to 'design for democracy at work'- which is the logic of Human-Centred Systems research - is therefore a much harder and more contentious task. (Williams, 1987).

Secondly, of the three examples summarised above, only the UTOPIA project covered the whole systems development process from analysis and design through to the building of a new product. The Danish and Finnish projects were only able to address design issues by undertaking assessments of existing systems, and proposing ways in which women could identify opportunities to influence future systems acquisition or design processes. In the office context, software is increasingly bought in rather than being developed 'in-house', and women clerical workers traditionally have little bargaining-power. Empirical investigation is needed to determine how far, in Kubicek's formulation, their involvement and cooperation may or may not become important for management to cultivate, through user-involvement or other means (Kubicek, 1983).

Thirdly, all three projects revealed a tension between group-based work and organisational and economic constraints. On a large scale, the UTOPIA project faced the unwillingness of U.S.-based multinational computer

companies to alter their priorities. On a more local scale, Gronfeldt and Kandrup commented openly on the Danish project's failure to equip women to take on long-term, political issues through union action. This is comparable to Hacker's account (1989) of the ways in which equal opportunities approaches to the American company AT&T only succeeded in reinforcing the company's overall strategy, as it recruited low-paid women into jobs soon to be automated anyway. Will these innovative projects always be marginalised? Or do they have the scope to provide examples which can be taken up in other workplaces?

Fourthly, there is the issue of gender and technology - addressed somewhat unevenly in Scandinavian approaches, as Ehn readily acknowledges (Ehn, 1988). Gronfeldt and Kandrup set out to investigate what a 'women's perspective' on technology might be; both they and Vehvilainen suggest forms of group initiative which can reflect women's experiences and concerns. But actual analyses of gender relations remain undeveloped here, so that on occasion there are references to 'women's values' with an essentialist flavour reminiscent of some of the other research on gender and technology discussed in Chapter Two (e.g. Rothschild, 1983; Turkle, 1984).

Joan Greenbaum has taken the lead in exploring this area. In a 1987 article, she outlines the ways in which systems development incorporates gendered oppositions which are

embedded in Western natural science traditions: 'hard' versus 'soft', objectivity versus subjectivity, thought versus emotion. She illustrates the ways in which, in conventional systems development approaches, greater status is accorded to paper-based 'information flows' - 'hard', quantifiable data - than to users' own descriptions of processes and priorities. This research indicates that links and parallels may usefully be established between feminist perspectives on epistemology and the critiques of technical rationality developed by Ehn, and in Human-Centred Systems research (Greenbaum, 1987; Bodker and Greenbaum, 1988 and forthcoming; Gill, 1990).

4.3 Human-Centred Systems Research in Britain.

Human-Centred systems research in Britain has not received the recognition, or the resources, which became available to the Scandinavian Collective Resource tradition in the 1970s and 1980s. As demonstrated by British government vetoes on a number of progressive EC proposals on human rights and workers' rights in the late 1980s, the political climate in the UK has not been favourable towards the general tenor of initiatives such as HCS.

Nevertheless, HCS research has developed, partly in cooperation with European partners. In a 1990 report, Karamjit Gill summarises its distinctive features as follows:

"Human-centredness rejects the mechanistic paradigm of

technology development and provides a powerful alternative philosophy for systems design and use. It rejects the idea of the 'one best way', 'one culture' and 'sameness' of scientific ideas. This focus on diversity provides a motivation to look at the structures which support innovation... Emerging European research on human-centredness builds on the idea of human-machine symbiosis and regards the social and cultural shaping of technology as central to the design and use of technological systems. It emphasises the interdependence between the subjective and the objective knowledge by placing practice, skill and dialogue at the centre of designing human-machine collaborative systems. This focus of research recognises the need for the active participation of citizens in shaping science and technology."

(Gill, 1990, p.3).

HCS, therefore, seeks to build both on epistemological critiques of the positivist tradition in science and technology, and on those developments in social science which reject technological determinism and seek to examine the ways in which technology itself is socially shaped. Four specific projects demonstrate both the scope and the limitations of HCS research to date, in Britain.

The first is Rosenbrock's research at UMIST, during the 1970s, into the development of CAD systems. Rosenbrock's aim was to develop systems designed to counter Taylorist views of automation, and to enhance human skill and autonomy, at workplace level, rather than marginalising

them. This led to the design and prototyping of a computerised 'human-centred lathe', which remained under the operator's control. As Gill comments, this project successfully addressed the issues of skill and autonomy at the level of an individual worker's job; however, 'human-centredness' in use cannot be inscribed in a piece of equipment, and the issues of interaction among workers, between workers and management, and of organisational change more generally, were not discussed.

The second relevant initiative was the now well-known 'Lucas Plan', devised by workers facing rationalisation and redundancy at Lucas Aerospace in the 1970s (Cooley, 1980, 1985). The aim here was to use high-technology skills and equipment to create 'socially-useful' products, rather than military ones, and thus to secure jobs and expand the company's scope. As Cooley has noted, the company rejected the Plan, but a number of its proposals were taken up both abroad, and by Labour local authorities in Britain (Cooley, 1985). This added a wider political dimension to HCS research.

The third relevant strand is what Gill describes as the 'Social Action Research' approach, exemplified by the 'Parosi' project at Brighton Polytechnic (Gill, 1986). Supported by the EC Social Fund, this project brought together health workers, computer scientists and women from Asian communities, to construct a knowledge-based system for providing advice on nutrition. This project appears to be unique, in British HCS research to date, in

having moved away from male-dominated, craft-based areas of work.

It is described by Gill as having helped to bring the focus on diversity into HCS research, whether in terms of cultures, of values or of disciplines. While this could help to create a basis for drawing gender issues into the HCS framework, these are not an explicit part of the 'diversity' Gill describes. His analyses of the project do not comment on whether or not gender appeared to be a significant issue in interactions between the different parties involved, or in the priorities they identified.

The fourth relevant project - the most recent, and perhaps the one with the highest profile - returns HCS firmly to its roots in craft engineering (Rosenbrock, 1989). This was a collaborative project, with British, Scandinavian and German partners, funded under the EC 'ESPRIT' programme from 1986 to 1989. The aim was to develop three aspects of a Computer Integrated Manufacturing system (CIM): a computer-aided design system, in Denmark; a computer-aided manufacturing system, in Britain; and a computer-aided planning system in Germany. A prototype product was indeed produced at each site by 1989. Unlike much other related research - for instance, in the Scandinavian context - the British and German project groups did not involve users directly. Apart from the prototypes produced, the project did usefully identify a number of issues and difficulties facing both HCS initiatives and other interdisciplinary projects. Gill cites a general example as follows:

"During the first meeting between social science and engineering groups, there was a feeling of distrust, scepticism and misunderstanding. The engineers feared that social scientists and user groups would generate unrealistic demands concerning technical specifications and software development. The social scientists feared that engineers would develop technical specifications and models too quickly, thereby undermining the development of human-centred criteria."

(Gill, 1990, p. 12).

And the users, it would appear, were rather paradoxically not invited to comment at all. To his great credit, in his 1989 account of the project Rosenbrock appends a full transcript of an early project meeting at which the user representation issue was uneasily debated.

From this brief resume of the somewhat limited range of HCS projects which have taken place in the British context, we can identify a number of issues. Firstly, the three most prominent strands in HCS, as identified by Gill, are all based in craft engineering contexts. Implicitly, these areas - associated with craft status, strong union organisation, and of course masculinity - have been seen as the priority. This immediately indicates that it is important for new initiatives in HCS to examine the potential for intervention in other kinds of context - and particularly, from a gender perspective, in areas of work in which large numbers of women are

employed. HCS concerns with skill and autonomy have been shaped in terms which predominantly mirror men's experience, and these have been explored with a strong emphasis on product rather than on process. The 'Parosi' project - and to some extent the identification of 'process' issues and problems in Rosenbrock's latest analyses - do offer opportunities to investigate how HCS research could be defined in ways which include gender perspectives. But these are rather tentative and implicit openings, in need of detailed exploration (see Chapters Nine and Ten).

Conclusion.

In the first section of this chapter I reviewed research which has demonstrated the problems represented by the dominance of a functionalist paradigm in information systems development. In different ways, both Hirschheim (1987) and Jackson (1985) seek to develop alternative approaches by combining elements of existing methodologies with insights from Habermas' critical social theory and, in Hirschheim's case, from psychoanalysis. These initiatives usefully identify the relationships between existing information systems development methodologies and social theory, but they have yet to be fully elaborated in practice. Hirschheim's approach, in particular, shows weaknesses in relation to the acknowledgement of relations of power and inequality within and beyond organisations.

In the second section of the chapter, I discussed

interdisciplinary research in Scandinavia. Here, a favourable political and economic context has facilitated quite extensive research, exemplified most clearly by the work of Ehn et al into 'designing for democracy at work' (Ehn, 1988). This 'Collective Resource' tradition is the one with which Human-Centred Systems research has most affinity to date. During the 1970s and 1980s it generated a number of projects, producing both prototype systems and a range of more general principles to support further collaboration between workers and systems designers. Later examples, in particular, have integrated theoretical reflections with practical techniques or proposals; most recently these have included preliminary investigations into the links between gender relations and systems design, although these are still marginal in relation to the main body of Scandinavian research. Taken as a whole, the Scandinavian 'Collective Resource' approach generates both a number of possibilities and a number of unresolved issues for further examination in a British context.

In the third section of the chapter, I discussed the Human-Centred Systems research tradition itself, in Britain. Although far less well-established than the Scandinavian research, this too has combined philosophical and political debate with the development of prototype systems. The most recent project took the form of a collaboration between British researchers and European partners, seeking to develop complementary elements of a human-centred Computer-Integrated Manufacturing system

(Rosenbrock, 1989). HCS research to date has, however, tended to focus on traditionally male-dominated areas of craft work: only one of the four initiatives discussed departed from this model, and this was the least 'high-profile' of the four.

The literature discussed in this chapter indicates that the area of interdisciplinary research into information systems development is both diverse and expanding. The related themes of 'social factors' and user relations in systems design are being explored, both theoretically and empirically. The constraints represented by prescriptive methodologies of the kind discussed in Chapter Three are being challenged, creating an environment to which Human-Centred Systems research can usefully contribute.

Gender relations, however, feature very rarely in these areas of research. Here, recent Scandinavian initiatives can help to identify relevant issues for further HCS research in Britain.

PART THREE:

CASE-STUDIES IN USER-INVOLVEMENT
DURING OFFICE SYSTEMS DESIGN.

INTRODUCTION:

In the following chapters, I aim to address the unresolved issues identified in Chapters One to Four, in relation to gender, user-involvement and information systems design.

To recapitulate briefly, in Part One I identified questions arising from labour process analyses of office computerisation. The case-studies presented in Chapters Six, Seven and Eight are not intended to answer questions concerning broad trends in women's employment patterns. Instead, they offer an opportunity to reexamine in depth the issues of skill and control in connection with women's clerical work, taking into account critiques of the 'gender-blind' character of many labour process studies. Are there specific clerical skills in evidence, in connection with information systems design? Have they been marginalised, or do they offer an actual or potential basis for clerical user involvement? How does an examination of women clerical workers' experience of office systems development processes compare with the mixed picture that is beginning to emerge of their experience of using information technology once installed? (Liff, 1990; Wagner, 1985).

More broadly, the case-studies also follow up the question of the ways in which gender relations are reproduced within the workplace. In the labour process tradition, Barker and Downing (1980) argued that increasing use of IT

was tending to break down gendered patterns within the office; West (1990) has suggested that an over-emphasis on gender relations within the workplace can obscure issues of class relations and of labour market trends. In contrast, others have found evidence that jobs as well as people continue to be 'gendered' (Davies and Rosser, 1985), and that these patterns are reproduced particularly strongly on the 'contested terrain' of technological development and use (Cockburn, 1985, 1986). In the case-studies which follow, I seek to examine processes of information systems development from a perspective which focuses on the inter-relations, and the tensions, between gender relations and management-labour relations. How do information systems development processes interact with these relations of power within organisations? To what extent are they constrained or shaped by them - and do they offer opportunities for positive intervention by women clerical workers, through human-centred systems approaches?

In Part Two, I noted the increasing range of information systems development approaches: both those of a formal, prescriptive nature, and those with an interdisciplinary and sometimes more radical basis. Recent studies have indicated that in a context in which many information systems fail to meet their stated objectives, concern with 'user relations' is increasing. In addition, there is some evidence that the more formal methodologies are rarely adhered to completely, and that new developments - notably the advent of Fourth Generation languages - are

now facilitating closer and more flexible collaboration between users and IS staff. The case-studies offer an opportunity to assess these claims, and to examine different formal or informal approaches.

The concern of human-centred systems research is to bring together these distinct questions, identified in Part One and in Part Two, and to assess the scope for new approaches to systems development which can integrate the concerns with gender, skill and power outlined in Part One. In the three chapters which follow, I draw together the questions summarised here in the form of two broad themes. The first concerns processes and practices in office information systems development. I identify the methodologies and techniques adopted, and the outcomes attributed to them; I also investigate how far 'user-involvement' has played a part in these processes, and how the term is understood by managers, systems developers and clerical staff. Further, I seek to investigate the relationship between each office systems development initiative and its social and organisational context. Specifically, I distinguish how each systems development approach has emerged, and how it appears to reflect, or perhaps to alter, existing practices and relationships within the organisation concerned - between and among managers, clerical workers and technical or professional staff.

The second theme concerns the area of women clerical workers' skills and experience, in connection with office

systems design. I focus in particular on the extent to which women clerical workers experience active involvement (formal or informal) or its absence, in connection with office information systems design. I analyse the outcomes of each process, for the clerical workers concerned, in terms of their day-to-day work and of more long-term trends and opportunities. I also place these specific concerns in the context of the gender and management-labour relations within each organisation, already referred to in connection with the first theme outlined above.

CHAPTER FIVE: RESEARCH METHODS.

INTRODUCTION:

In the four preceding chapters, I have discussed a range of quantitative and qualitative research in the areas of gender, information technology and the design of office information systems. Quantitative research has made visible the continuing under-representation of women within computing (and in other technology-related areas), and the enduring nature of gender divisions in employment in general (LSPU, 1988; Liff, 1985). But to complement and extend this, qualitative research has been required in order to investigate the complex processes through which these gender divisions are reproduced, modified or challenged (Cockburn, 1985; Pringle, 1988; Liff, 1990). The range of recent, interdisciplinary initiatives in systems analysis and design have also adopted qualitative methods. (Ehn, 1988; Tijdens et al, 1989). The two areas identified at the end of Part One clearly come into this second category: they call for an in-depth, qualitative approach, focussing on periods of social and technological change within organisations. In section 5.1 below, I describe in detail the qualitative methods I adopted; in section 5.2, I summarise my approach to analysing qualitative data. Section 5.3 indicates some of the strengths and weaknesses of the data gathered. In section 5.4, I end the chapter with a brief discussion of issues relating to feminist perspectives on research in general, and on the validity of qualitative research.

5.1: The Case-Studies:

I chose to base my empirical research on case-studies for three reasons. Firstly, this approach provided the opportunity to analyse in detail the differing or conflicting perspectives of managers, clerical workers, trades unionists and systems designers. Secondly, case-studies also allow for in-depth observation over a sustained period of time: an essential factor in the study of complex systems development projects, which commonly require a year or more to carry out. Thirdly, this approach is now prominent both within recent interdisciplinary research initiatives in computer systems design, and within the emerging sociology of technology. (See for example Docherty et al, 1987; Bijker, Pinch and Hughes, 1987). Adopting a case-study approach here therefore allows for the possibility of comparing the outcomes with other research in related areas. (Cain, 1987).

There have been two clear stages in the research:

- (i) an investigation of the office systems development process in two organisations, based on in-depth interviews and on observation of the clerical labour process, following the implementation of a new computer-based system;
- (ii) an analysis of two systems development projects in progress, over a two year period: one in which a

mainstream, conventional approach was adopted, and one which provided the opportunity for new initiatives during the early, planning stages. In relation to the latter, the Human-Centred Office systems research team was an active partner, within an 'action-research' role. (See 5.1.2. below).

5.1.1. Selecting and Planning the Case-Studies:
the First Stage:

Early in 1986 I wrote to seven major local organisations, which I had identified both as being substantial employers of clerical workers, and as engaging to some degree in processes of office computer systems development. Four responded favourably to my request for an initial meeting. In May 1986, I confirmed arrangements for the first stage of research with 'East End Engineering' and with 'City Libraries'. I selected these two for the following reasons:

- (i) both represented significant areas of local employment (engineering and local authority services);
- (ii) both offered the opportunity to study examples of recently-implemented systems, as well as the possibility of observing future developments in progress;
- (iii) the two organisations provided the opportunity to study contrasting approaches to IT in general, and to systems development in particular.

I carried out a series of visits and interviews in both organisations, between May and July 1986. In each case, these focussed on one particular department, in which a new computer system was in use.

At East End Engineering, I interviewed nine people at length: four men and four women in the 'Procurement Department', and the senior systems designer responsible for developing the recently-implemented computerised system they were using. In the course of negotiating access to the company, I also interviewed two trade union representatives and three senior managers. I took care to approach management and union at the same time, in order to avoid letting the research become over-identified with either. However, industrial relations at East End were very strained at this time, and senior management viewed research contacts with trade union representatives within working hours as inappropriate. The trade union interviews therefore took place outside working hours, in the two representatives' homes.

At City Libraries I adopted a similar approach, gaining agreement from both senior management and the local NALGO branch for access. Here, I focussed in depth on 'Bibliographical Services', the section within which staff had seen a computerised library catalogue take shape over a ten-year period. I interviewed at length five women and two men in the section. In this case, the designer responsible for the development itself was no longer in

post; however, I was able to interview both the Computer Services Division liaison officer who had taken over his role, and City Libraries' own recently-appointed Computer Development Librarian.

I recorded meetings and interviews with management and trade union representatives in notes, taken at the time or immediately afterwards. The longer interviews, conducted in each department or section, were all tape-recorded and transcribed.

5.1.2. Selecting and Planning the Case-Studies: the Second Stage:

My original plan was to use the detailed accounts gathered in the first stage of the research as a guide for more intensive observation and analysis of two large office systems development projects as they progressed. I hoped to compare two different methodologies in action, in order to analyse their general effectiveness from the point of view of women clerical users, and to formulate some general criteria or guidelines to support 'gender-aware' human-centred approaches.

In the event, it proved impossible to find two local organisations within which major projects could be observed from beginning to end, within the planned research period. Nor was it possible, as I had originally hoped, to carry out further research at East End Engineering: external circumstances caused management in the company to delay further developments in office

systems for six to twelve months. Nevertheless, by October 1986 I had managed to negotiate arrangements for two substantial case-studies, as follows:

(i) City Libraries:

During the preliminary phase of research, it became clear that both senior managers and the Computer Development Librarian already viewed the existing, incomplete computerised systems at City Libraries as a serious problem. Plans for bringing in a new, integrated library system were under discussion; two assistant directors had undertaken to produce a systems specification. The high degree of staff dissatisfaction with existing systems was a major concern, however; senior managers felt they could not afford to allow a new phase of computerisation to intensify this, but at the same time they did not feel equipped to develop a sound approach to staff involvement or consultation.

Therefore there was a basis for further research, and for this to include active collaboration between City Libraries and the Human-Centred Office Systems Project. In particular, City Libraries offered a good environment in which to explore opportunities for women clerical workers' involvement in systems development: improving conditions for the relatively low-paid non-professional staff (of whom 395 out of 400 were women) was already a general priority for the departmental director.

Between October and December 1986, I was able to make

plans to follow up some aspects of the Scandinavian initiatives discussed in Chapter Three, in collaboration with staff, trade unions and management at City Libraries. After preliminary discussions and periods of observation, in a range of library branches and sections, I convened a 'study circle', or workplace discussion group, involving six women library assistants in the Central Library. This group produced a report for City Libraries management team, which led both to the convening of six further study circles over the following two years, and to the establishment of a 'design team' with library assistant representation. (This is described in detail in Chapter Nine).

I took an active part in facilitating the first study circle, in 1987, and the final one in 1990 (intervening groups were facilitated jointly by library assistants and other HCOSP staff). Following the first study circle, I interviewed in depth the six women who had taken part. I also interviewed members of the management team, NALGO representatives, and the computer development librarian. In the winter of 1989-90, I also interviewed ten of the women who had taken part in subsequent study circle groups (just over fifty women took part in study circles all together), During 1989 and 1990, I also attended regular meetings of the design team, with two colleagues from the HCOSP; our involvement included observation, feedback concerning the discussions and activities observed, and specific facilitation in the areas of job

design and systems selection and evaluation exercises. My specific focus, in this context, was on the ways in which women library assistants contributed to the design group.

Issues regarding the interviews, and the study circle approach itself, are discussed further in sections 5.1.4 and 5.1.5 below. The case-study account in Chapter Nine refers to the period between October 1986 and October 1990; my active involvement took place during two periods - from October 1986 to October 1987, and then from April 1989 to October 1990 (with an intervening period of maternity leave during 1988).

(ii) City Personnel:

The second local organisation in which I was able to arrange a substantial case-study was 'City Personnel' - another department of the same major local authority. While this choice ruled out any possibility of comparing systems development approaches in the public and the private sectors, it did permit an in-depth comparison of two contrasting organisational contexts, and systems development approaches.

Despite being two departments of the same authority, in practice City Libraries and City Personnel were separate organisations, with contrasting histories, policies and cultures. Increasing economic and political constraints, embodied in central government policies, affected both departments; however, their responses differed enormously,

as did departmental interpretations of formal local authority policies in areas such as equal opportunities. Similarly, senior managers in City Personnel, like those in City Libraries, had become frustrated with the way in which previous approaches to computerisation had been handled by the local authority Computer Services Division (CSD). But in contrast with City Libraries, their response was to work more closely with CSD, using 'LSDM' - the structured systems analysis and design methodology discussed in detail in Chapter Two. The case-study therefore offered an opportunity to observe this widely-used methodology in practice, and to compare it with the more exploratory approach being considered in City Libraries.

City Personnel management, the NALGO branch and Computer Services Division management all agreed both to my attendance at relevant meetings as an observer, and to in-depth interviews at regular intervals. Between September 1986 and September 1988, I attended 'design team' meetings regularly, in CSD and in the City Personnel department; in addition, I observed some of visits made by team members to other council departments, for systems analysis purposes. I also interviewed the eight design team members at three key points: shortly after their project began; at the end of the preliminary analysis stage, and when the pilot version of their new system was completed.

4.1.3. Reactions to the research project:

In both phases of the research, I anticipated that my research aims would be perceived differently by the four groups of people I needed to meet and interview. The research was explicitly concerned with improving opportunities for women clerical workers, in connection with computerisation: a welcome focus, perhaps, for office workers - but a more controversial or ambiguous one for their male colleagues, or for managers and systems designers. In order to present myself and the research aims in a consistent way, I took a number of steps:

- (i) I contacted trades union representatives and management at the same time, in each case, in order to avoid allowing the research to become too strongly associated with one or the other;
- (ii) I gave verbal and written outlines of the research aims to both managers and trades union representatives, in advance of preliminary meetings;
- (iii) I invited questions and comments, both during meetings and during interviews, and responded to these as fully as possible.

I met with varying responses. Management at East End Engineering refrained from any comment on the fact that I was particularly interested in women's experience of office systems development; my impression was that they agreed to research access largely because of their image

of the company as being 'at the leading edge' in terms of technological innovation. In the Procurement Department, the departmental manager initially selected interviewees; however, by spending time in the department as an informal observer, I was able to approach and interview a wider range of clerical staff. (I have commented above on the strained industrial relations prevailing at the time of the case-study, which inhibited formal contacts with the trade unions).

These limitations did not apply in City Libraries, where an explicit focus on equal opportunities was welcomed. I was free to contact union representatives formally as well as informally, and to develop my own contacts with staff in a wide range of branches and sections. On the other hand, relations between City Libraries and the Computer Services Division had deteriorated to an extent which made it difficult to gain access to certain individuals associated with previous phases of library computerisation.

Responses in City Personnel came somewhere between these two extremes. Management there were extremely helpful regarding access to design team meetings and activities; on the other hand, they expressed some unease on the issue of contacts with trades union representatives; this was resolved after discussion, when they felt reassured that research contacts would not interfere in any way with discussions about the computerised personnel information project through the normal industrial relations channels.

They also decided to refuse access to meetings of the 'steering group' which was convened to oversee the detailed work of the design team. In fact this did not prove to be as disappointing as it seemed at first, since this 'steering group' never became a viable entity, and only met once during the case-study period.

In all three organisations, the range of systems users I interviewed - male and female, professional and non-professional - responded very generously to my considerable demands on their time. The women office workers I met responded to my questions with very detailed accounts of their day-to-day work; however, their expectations of seeing any substantial improvement, in working conditions or career opportunities, were low in all cases. This was reflected in their generally cautious responses to those aspects of the research which explicitly addressed new opportunities and approaches, in connection with office systems design.

5.1.4: The Research Interviews:

From differing perspectives, two related sets of methodological issues have been raised, in connection with the use of interviews as a research tool. Firstly, concern has been expressed about the role and influence of the interviewer. Many traditional research methodology textbooks are concerned with possible interviewer bias or undue influence (Denzin, ed., 1970; Galtung, 1967; see also discussion in Oakley, 1989). In contrast, feminist

contributions to the research methodology literature have rejected the positivist conception of a neutral, value-free or detached role for the interviewer, but address instead its potentially powerful or exploitative aspects, in relation to research subjects. (Finch, 1984; Oakley, 1981; Stanley and Wise, 1983).

In this connection, I discuss in section 5.4 below some epistemological reasons for making the researcher's role and procedures as explicit as possible, and for rejecting the positivist model of the research process. At a practical level, I included three elements in interviews:

- a brief verbal introduction of my work, and of the research project in general, including an assurance of confidentiality;
- the structuring of the interview around a common core of themes and questions, as a basis on which I invited interviewees to give detailed descriptions of their experience, rather than giving short, fragmented answers;
- an open invitation to interviewees to raise questions, or add comments, over and above these common themes.

In this way I hoped to establish a dialogue, in which the purpose of the research would be clear to those interviewed. Although I retained the overall initiative, I hoped to create an atmosphere in which interviewees would be able to express doubts or hesitations, or to raise issues I had not anticipated. (Cockburn, 1985).

The second set of concerns about the interview as a research technique relates to the way that they may only represent a 'snapshot' view. One set of interviews provides neither naturally-occurring data, nor a view of social processes and relations as they change over time (Silverman, 1985; Cain, 1987).

Regarding this second point, each interview did include a detailed account of the systems development process experienced, in order to build in some assessment of changes and developments over time. I also spent time in each department as an informal observer, both before the interviews began, and during intervals between interviews. However, this too has its artificial aspects; in some ways, it is less open to question or comment by those being observed than an interview approach. In general, I found that short periods of observation confirmed or supplemented the data gathered in interviews, rather than leading to radically different conclusions. These concerns largely related to the first phase of case-study research; since the second phase was much more extensive, there was substantial scope for reflection on developments over time, both during interviews and in other contexts.

There were some points I had not anticipated fully, until I began to carry out the first interviews. I had underestimated how hesitant some interviewees might be, when invited to describe their experience and their impressions. Many women, in particular, prefaced long, detailed accounts with self-deprecating comments,

particularly in connection with computerisation and systems design issues. However, if references to terms like 'systems design' sometimes had an inhibiting effect, this seemed to be counteracted by my status as an outsider, and a non-technical, 'non-expert' one at that. Whereas I had expected this to detract from my credibility in some quarters, it seemed in fact to make it easier for interviewees to relax and talk freely about their work - whether this was defined as technical or as clerical.

Lastly, my original aim had been to find a quiet room, in each organisation, in which to carry out interviews. This proved unexpectedly difficult, during my initial visits to East End Engineering; I therefore agreed to conduct the first three interviews in the department itself, sitting with each person at their own desk. My worry that this would be too public proved unfounded. Instead, the general level of bustle and conversation made the interviews inaudible to colleagues; interviewees were also able to illustrate relevant points by referring to documents or VDU screen displays within easy reach. It was easy to establish a relaxed, informal atmosphere; my presence was visible, and clearly related to everyday work - rather than taking on any overtones of assessment, or of 'checking up' on people. This was particularly important at East End Engineering, where I was introduced to interviewees by the departmental manager. However, I found the same approach helpful during case-study visits to all the organisations.

Most interviews lasted approximately one hour, with some extending to an hour and a half. In the first phase of case-study work, each interview was self-contained; in the second phase, however, I interviewed a small number of people at different stages of their work, and also met and talked with them informally, in the course of systems development activities and discussions. In these cases, the research interviews provided an opportunity both to confirm or clarify observations made during visits and meetings, and to build up an explicit picture of the systems development process over a number of months.

A sample interview schedule is attached in Appendix A.

A sample interview transcript is attached in Appendix B.

5.1.5. The Study Circle Approach:

Workplace 'study circles' have been used in a variety of contexts. Swedish trade unions have used them as part of consultation and training processes, in connection with the introduction of IT, for instance; they have also been used as part of British trade union initiatives, unconnected with IT, to make contact with women members in the service sector. In contrast with management-inspired 'quality circles', study circles emphasise active involvement by the participants, through working on an agenda they largely define themselves. The groups can provide a basis for 'consciousness-raising', in the feminist sense; they can enable participants to develop a

mutually-supportive network, and also to gain access to new ideas and information (TBV, TCO and Arbetslivscentrum, 1982; Vehvilainen, 1986, 1991).

I viewed the study circle method as appropriate in the context of the City Libraries case-study because it allowed scope for active involvement on the part of library assistants, without predetermining the outcome (Silverman 1985). The study circle process invites participants to identify issues and then to work on them, through activities and through critical reflection; it is a means for arriving at new ideas or new plans, rather than being a means for putting across a pre-existing model, or body of knowledge.

This was important in two respects. Firstly, working on this basis allowed genuine collaboration to develop, rather than leaving initiative in my hands, as the researcher, or in the hands of the Human-Centred Office Systems Project as a whole. That is, as a systems development technique, the study circle method acknowledged the importance of establishing an active partnership between 'users' and 'experts' (of whatever status) in connection with systems development (c.f. Ehn, op cit; Vehvilainen, op.cit.). This was particularly important in the City Libraries context, where both staff and management were explicitly looking for opportunities to develop new approaches to user-involvement in systems development. Secondly, both in research terms and in relation to systems development, the study circle approach

offered particular advantages from a gender perspective. Rather than being defined as novices or as passive victims or beneficiaries, in relation to information technology, women study circle members were invited to review their working knowledge and experience, and to use it actively in order to assess new systems and new organisational possibilities. As a research tool, therefore, the study circle method had the potential to explore aspects of women clerical workers' experience not addressed fully in more conventional approaches. (Gronfeldt and Kandrup, 1985).

Vehvilainen (1986) comments on the difficulty of combining the two roles of researcher and facilitator, within a study circle context. I therefore chose to work closely with City Libraries' own Research Assistant, on convening and facilitating the first study circle. We planned activities and resources together, and both took an active part in each session; but working in this way, I was free to observe and to take notes at the same time, rather than having sole responsibility for responding to the group discussion.

For the purposes of the first study circle, we limited our initial approaches to the various sections within the large Central Library. We circulated to each section a short leaflet explaining the aims and possibilities of a study circle, and followed this up with an informal visit and discussion with non-professional members of staff. This aroused cautious interest; staff felt that the study

circle was a thought-provoking proposal, but they also recognised its time-consuming nature (even though it would take place within work time). Their main concern was to find out whether or not there was any management commitment to taking up any proposals or comments that might result from the study circle work. I was able to reassure them that there was a senior management commitment to discuss outcomes with study circle members at the end of their series of meetings, and on this basis, the group established itself, with six women members. A description of the pilot study circle process appears in Chapter Nine, with an account of the way in which the City Libraries 'design team' structure was initiated by study circle participants.

5.2 Analysis of the data:

I kept a detailed written record of the meetings, discussions and study circle sessions outlined above; and as indicated above, the main interviews were tape-recorded and then transcribed.

My preliminary approach to analysing this mass of detailed material was to list the array of research themes and questions addressed, subdividing them into distinct aspects where appropriate, and allocating a letter to each. (The interview schedule attached at appendix formed the basis of this framework). I then went through each interview transcript or set of discussion notes, coding areas which corresponded to a given aspect -

user/IT expert relations, for instance, or informal clerical participation in systems development decisions. Where unanticipated areas or concerns emerged, I noted these, expanding or amending the letter-coded framework. This process, therefore, generated some new aspects or concerns, not anticipated in my original sets of themes and questions.

I was then in a position to assemble and compare material from different sources, on common themes. On this basis, I initially constructed chronological outlines of the systems development processes described. I then went on to address the more complex and problematic areas raised by research subjects: conflicting perceptions, or areas of doubt and uncertainty. In the accounts which follow, I have tried to reflect these accurately, and to use quite detailed interview extracts in order to indicate clearly the basis on which I have arrived at my own interpretations.

5.3. Strengths and Limitations of the Data:

The case-studies which are described in Chapters Six to Nine all address the issue of clerical involvement in processes of office systems development. In this respect, as I have argued in the Introduction to the thesis, they represent an original contribution to UK research, both within sociology and within interdisciplinary approaches to office systems development. The strengths of the data derive partly from this originality, and partly from the

range and the sustained application of the qualitative methods adopted.

There are also important limitations in relation to the data described in the following chapters. The analysis of office systems development processes, in three organisations, is intended to provide insights into processes of systems analysis and design, and into the ways in which human-centred systems development techniques might be formulated, in order to support women clerical workers' active involvement. Although a range of systems development approaches are discussed, they do not represent the full range of available systems development methodologies; this was not possible within the timescale available.

The case-studies allow for comparisons in a number of common respects; all, for instance, illustrate the relevance of clerical skills and experience to processes of systems design. Together, the case-studies contribute to analyses of gender and user-involvement issues, throughout the entire systems development life-cycle; but time constraints, intensified by delays within the organisations in question, made it impossible for any single case-study to cover the development process from start to finish. Chapters Six and Seven provide detailed accounts of two contrasting approaches to systems development, from the perspectives of users already operating installed systems; this data does permit a comparison between an approach based on limited user-

involvement, and one which excluded user-involvement. Chapters Seven and Nine, however, are based on observations of systems planning and development approaches in progress. Neither process was concluded, at the end of the research period; the data allows for detailed comparisons of the early planning stages, in systems development, but each case-study also offers other insights, which have to be discussed in their own right, as well as in relation to other recent research on user-involvement in systems development.

5.4. Issues of Validity in Qualitative Social Science Research:

The increasing use of qualitative methods in social science research has been described by Silverman (1985), Finch (1987) and many others. This has taken place in the context of two broad developments relevant to this thesis. Firstly, there has been a breakdown in the postwar 'orthodox consensus' in sociology, as a result both of social and economic crises not envisaged by the 'industrial society' theorists of the 1950s and 1960s, and of detailed critiques of positivism and functionalism (Giddens, 1982). Secondly, a feminist critique has developed, of the exclusion or marginalisation of women's experience, in traditional social science theory and practice (Oakley, 1974). This has been followed by work arguing that attempting to 'add on' women, or gender, within 'mainstream' theoretical frameworks is not adequate; instead, the relevance and impact of gender

analyses needs examining in all areas of social science (Bowles and Duelli-Klein, 1980; Stanley and Wise, 1983; Dex, 1985; Walby, 1986). Contributions in both these areas have addressed the issues of validity and rigour in qualitative research in considerable detail. Below, I contrast the interpretive approaches which have been prominent in anti-positivist critiques with feminist approaches which draw on realist philosophy, and on the concept of 'standpoint-specific' knowledge. For reasons which I will discuss, I have found this latter approach the most consistent and satisfactory basis, in relation to my own research.

One set of anti-positivist critiques in social science rests on the identification of the social world as 'inter-subjective', in contrast with the natural world. Drawing on the work of Dilthey, and of more recent theorists in the hermeneutic tradition, such as Gadamer (1975), social science is seen as interpreting social processes, rather than identifying causal laws, or manipulating discrete causal variables. Actors' own purposes, meanings and interpretations are the material for social scientific analysis. Social scientists are also part of the world they study, using the same resources as those they observe, in order to identify meanings, and involved in 'negotiated interaction' with them (Silverman, op.cit; Ashworth, 1987). Therefore, this relationship, and the researcher's own starting-points, cannot simply be regarded as sources of 'bias' to be minimised; instead,

they become part of the issues to be made explicit in the research process.

This general approach has been developed within differing perspectives in social science: symbolic interactionism (Blumer, 1956); phenomenological sociology (Schutz, 1972); ethnomethodology (Garfinkel, 1967). It has provided a basis for critiques of some structural approaches (both functionalist and Marxist) which have neglected the role and the significance of human agency (Silverman, op.cit.). For some feminist researchers, it has proved more compatible than Marxist-feminism, or other 'macro' theoretical approaches, with a commitment to studying and respecting the varying experiences women have of subordination. Stanley and Wise (1983) find ethnomethodology particularly appropriate to their conclusion that "the analytic use of feeling and experience in an examination of 'the personal' should be the main principle on which feminist research is based (Stanley and Wise, op.cit., p. 178). For Stanley and Wise, validity and rigour in the research process depend crucially on the researcher's willingness and ability to be 'vulnerable': that is, to make his or her starting-points, procedures and difficulties as available for critical examination as the research conclusions.

In a different context - outside feminist debates - Ashworth (1987) summarises the main features of this kind of approach, locating it within the hermeneutic tradition exemplified by Heidegger and by Ricoeur. Qualitative

research is seen as having three stages: firstly, an examination of the researcher's own 'fore-understandings', which structure the choice and planning of the inquiry; secondly, the interrogation of that aspect of the social world which is seen as the problematic or confusing 'text' to be clarified; and thirdly, critical reflection on the fore-understandings, in the light of this interrogation. Adequacy checks are required at each stage. These include examining fore-understandings in relation to the researcher's own position and experience, vis-a-vis the people being researched; ensuring that interrogation of the social world will allow scope for doubts to be cast on the fore-understandings; and assessing the coherence of final reflections through both academic debate, and (in some circumstances) communication with members of the social group being researched. (Ashworth, op.cit., p7 ff).

These methodological concerns and techniques are shared both by feminist researchers (within varying epistemological and methodological frameworks), and by proponents of a 'realist' philosophical and epistemological approach. However, I want to argue that in three important respects, an approach drawing on realist epistemology - and specifically on the 'feminist standpoint' approach - provides the soundest basis for the research described in the following chapters.

(i) The Relationship between natural and social science:

Anti-positivist critiques which propose social science

approaches appropriate to an 'intersubjective' social world tend to leave intact a fundamentally positivist model of natural science (Bhaskar, 1979). Implicitly, a contrast remains between 'hard' natural science - *"the anchoring of theories in observation statements, verification and prediction"* - and 'soft' social science, concerned with interpretation and subjectivity (Giddens, 1982, p. 12).

But closer examination reveals this opposition to be problematic. Firstly, debates within the history and philosophy of natural science have identified both the role of theory in structuring observation (Popper), and - in opposition to Popper's falsificationism - the predominance in scientific communities of particular paradigms (Kuhn, 1962), or research programmes (Lakatos and Musgrave, 1970). Subjective criteria clearly play a part in the identification and resolution of problems within natural science: theories are judged partly according to criteria such as economy or elegance (Easlea, 1973, p. 322).

Giddens concludes:

"they [Kuhn et al] have made it plain that science is as much about 'interpreting' the world as about 'explaining' it, and that these two forms of endeavour are not readily separable from one another." (1982, p.12).

Secondly, recent studies have begun to explore the ways in which gender divisions have shaped both the history of

modern Western science, and current patterns in training and in career development within science and technology. Positivist models of natural science, in particular, reflect dichotomies which have strong gender associations in Western cultures: reason (male) as against emotion (female); logic (male) as against intuition (female); concern with objects (male) as against concern with people (female). These oppositions are echoed in the commonly-repeated contrast between 'hard' (real) natural science, and 'soft' social science, referred to above; they reappear within computer science, in relation to the contrast between 'hard' and 'soft' systems development methodologies, discussed in Chapters Three and Four. These dichotomies have formed part of a pattern in which science and technology are associated with masculinity, at a cultural level, and remain heavily male-dominated in practice. (Easley, 1981; Faulkner and Arnold, 1985; Cockburn, 1985). Feminist research has initiated a critical reexamination of these gendered patterns, contributing to a more general rejection of the positivist model of science. But the issue of defining feminist conceptions of scientific practices remains hotly debated (Harding, 1986; McNeil, 1987; Haraway, 1991).

Within a realist perspective, the opposition between natural and social science, with its gendered associations, is challenged. The role of interpretation in both is recognised; both are seen as identifying tendencies rather than laws, in the context of particular paradigms. These paradigms, in turn, are assessed in

terms of their ability to generate research programmes "yielding sequences of theories, progressively richer in explanatory power." (Bhaskar, op. cit., p.126). The claim here is that social sciences can be sciences in the same sense as natural sciences - but not in the same way (Bhaskar, op.cit., p.127). The unique ways in which actors in the social world construct their own interpretations, and also respond to research interventions, are recognised. Therefore, it is appropriate to assess social science theories according to explanatory but not predictive power (Bhaskar, op.cit., p.127; Giddens, 1982, pp.12-13; Silverman, 1985, p.79).

(ii) The 'Micro-Macro' Opposition in Sociology:

While 'interpretive' approaches in sociology have successfully demonstrated the complexity and the importance of human agency, their emphasis has generally been mainly on the 'micro' or local, everyday level of interaction. With reference to the sociology of organisations, Silverman demonstrates how structural factors have tended to be under-emphasised, in interactionist and ethnomethodological studies (Silverman, op.cit., pp 72-77). The debate between 'micro' and 'macro' approaches has been prominent within the sociology of technology - for instance in the contrast between studies emphasising structural influences and processes, and ethnomethodological studies of laboratory communities (Pinch, Hughes and Bijker, 1985; Russell and Williams,

1987). Russell (1986) argues that analyses of the ways in which scientific or technological achievements are taken up, or not taken up, require an examination of the ways in which social, political or economic processes interact with those at the level of the laboratory or other organisation.

There is clearly some overlap, however, between 'micro' and 'macro' approaches, both in general terms and in the use of specific research techniques. Yet if the 'micro-macro' opposition is to some extent both misleading and "a phoney way" it has nevertheless left its mark on teaching and research in sociology (Giddens, 1984, p. 139). In fact, a realist approach can underpin the acknowledgement of the mutual relationship between actors' perceptions and relationships, and the constraints represented by structural processes. With somewhat different emphases, this is the approach arrived at independently by Bhaskar and by Giddens. For the former:

"... people, in their conscious human activity, for the most part unconsciously reproduce (or occasionally transform) the structures that govern their substantive activities of production. Thus people do not marry to reproduce the nuclear family, or work to reproduce the capitalist economy. But it is nevertheless the unintended consequence (and inexorable result) of, as it is also the necessary condition for, their activity."

(Bhaskar, op.cit., p.124).

In terms of Giddens' theory of structuration, neither human agent nor social institution is regarded as primary: "the notion of human 'action' presupposes that of 'institution', and vice versa." (Giddens, 1984, p.139). Within the sociology of technology, analyses which have addressed the inter-relations between structural and local or personal processes include the studies by Cockburn (1985), and Mackenzie and Wajcman (1985) discussed in Chapter One.

(iii) The Potential Inconsistencies of a Relativist Position:

In addressing in detail the role of the researcher and his or her values in the research process, contributors to feminist research methodology literature have highlighted an important aspect of post-positivist debates. Rejecting the view that knowledge can be 'value-free', however, raises the issue of relativism: are all 'knowledges' equally valid? Dex, for instance, points out how the unambiguous demonstrations of the impact of gender divisions within social science, put forward by Stanley and Wise, sit uneasily with the ethnomethodological emphasis they place on 'explicating' different points of view, rather than accepting or rejecting them (Dex, 1985). In her broader review of feminist debates on methodology, Harding concludes:

"If feminists were merely arguing that men's experiences provide only a partial grounding for knowledge claims, then relativism would be an appropriate

epistemological stance... Instead, it is precisely because we cannot 'add women' and gender to the existing bodies of social scientific belief that relativism is inappropriate. Existing bodies of belief do not just ignore women and gender; they distort our understanding of all of social life, by ignoring the ways women and gender shape social life, and by advancing false claims about both women and gender."

(Harding, 1987, p.189).

Researchers who combine the realist concern to examine the links between human agency and structural constraints, with a feminist methodological emphasis on 'vulnerability' or openness in the research process, have put forward the concept of 'standpoint-specific' knowledge. Referring both to feminist theory (Hartsock, 1983) and to the issues discussed above in sections (i) and (ii), Cain argues:

"For example, the sex-gender structure could never have become visible from a male standpoint, because this configuration of relationships is in part constituted by male modes of thought which conceal it. (Although once such knowledge has been generated from the standpoint of women, men can of course know it too)."

(Cain, 1987, p.5).

"Configurations of relationship" are seen as being of varying scope: the class or sex-gender structure, for instance, as compared with the hierarchy in a single organisation. Crucially, researchers must analyse their

own location within these relationships, in order to transform the 'site' this represents into an explicit and theoretically chosen 'standpoint'. (c.f. Hartsock, op.cit).

Through this process of 'theoretical reflexivity', researchers are able both to make their own values and procedures available for critical debate, and to identify how far comparative analyses may be developed, with reference to other research which shares the same theoretical standpoint. In technical terms, standpoint theorists emphasise the importance of adopting methods which will facilitate the gathering of information about relationships which have not been theorised in advance, as well as about those which can readily be described by actors themselves: that is, 'open' techniques, such as in-depth observation or open-ended interview.

Cain summarises four general criteria for assessing knowledge:

- the extent of adherence to realist methodological principles;
- the extent to which a new theory can satisfactorily account for previous theoretical explanations in the area;
- the extent to which the knowledge 'works', or enables those from whose standpoint it was produced to affect their circumstances;
- accessibility to public scrutiny and debate.

(Cain, op.cit., pp 18-20).

This approach is a response to the same fundamental concerns identified by researchers working within interpretive frameworks. That is: the importance of making explicit the researcher's initial theoretical approach (or 'fore-understandings'), and of reflecting critically on these, in the light both of the researcher's own position in relation to those researched, and of empirical work. In my view, however, the concepts of site-specific and standpoint-specific knowledge provide important clarification. In particular, structural processes and relationships are explicitly addressed, in the identification of both 'sites' and 'standpoints'; the danger of under-emphasising these, discussed above, is avoided.

As Harding (1987) points out, the 'standpoint' approach represents one prominent strand within feminist contributions to research methodology debates, drawing specifically on the Marxist view of knowledge as shaped and developed in relation to material struggles and conditions of life. In this respect, the 'feminist standpoint' approach shares a common political and epistemological basis with much recent human-centred systems research. What Harding refers to as 'feminist empiricism' represents another strand, challenging what is seen as male bias within social scientific enquiry, but not questioning the empiricist model itself (Harding, op.cit., p. 182-187). In some respects, both undermine the theoretical frameworks within which they have

developed. The feminist standpoint position places a necessary emphasis on gender relations in their own right; they are not seen as being reducible to, or encompassed within, class relations as conceived in Marxist theory. The feminist empiricist position does not accept that rigorous application of the scientific method alone can eliminate androcentric bias, and argues that the social identity of the investigator - including his or her gender - can have a bearing on the identification of legitimate or interesting areas of enquiry. Both are also in dialogue with theorists who question the validity of any attempt to define scientific practice in universal terms - in particular those who are trying to define the scope of 'post-modernist' or 'post-structuralist' research, in terms of gender (Nicholson, Ed., 1990).

Conclusion:

To summarise, then, I have described a research process based on case-studies, using interviews, group discussion and an 'action research' element in the context of the Sheffield Human-Centred Office Systems Project.

I have argued that there are three areas in which a realist epistemological perspective - expressed in terms of 'standpoint-specific' knowledge - can provide a sound basis for research on gender issues in connection with human-centred systems development. Firstly, such a perspective supports an anti- or post-positivist critique relating both to natural and to social science. Secondly, it focuses on the inter-relations between structural

processes and human agency and subjectivity. Thirdly, it permits the researcher's own values and starting-points to be made explicit, without the adoption of a relativist position.

I now turn to detailed accounts of information systems development processes in a range of organisations, with specific reference to women clerical workers' perspectives, and to gender relations in general.

CHAPTER SIX:

'ONE OF THE LUCKY GIRLS...' OFFICE SYSTEMS DEVELOPMENT AT EAST END ENGINEERING.

INTRODUCTION:

In this chapter, I describe the development and use of a substantial office information system in a major engineering firm. In section 6.1, I place the systems development initiative in context, summarising the main features of the company itself and of the 'Procurement Department' within which the new system was designed and used. In section 6.2, I describe the systems development process itself, and in section 6.3 I move on to discuss the experience of professional and clerical users of the new system. In section 6.4, I contrast the experience of staff in word-processing with that of clerical staff using the new Procurement system. In section 6.5, I then discuss the East End Engineering example in relation to the two central themes put forward in the Introduction to Part Three: that is, a critical examination of information systems development methodologies within organisations, and a specific examination of women clerical workers' skills, experiences and opportunities in this context.

6.1 Background:

6.1.1 The Company:

East End Engineering was originally a Yorkshire company. It is now a UK-based multinational, with its headquarters

in London, and subsidiaries in twenty seven countries. In recent years, a takeover bid from the USA was successfully resisted; meanwhile, East End itself has acquired a number of smaller, local engineering companies.

The company designs and manufactures equipment which is assembled and tested, and then shipped in parts to final destinations in Britain or abroad, where East End staff reassemble and install it. Examples of recent contracts include two chemical plants exported to New Zealand; steel rolling mills exported to Mexico and to China; and modernisation of equipment for British Steel. East End also produces computerised monitoring and control systems for use in steel rolling mills.

In 1983, some two thousand people were employed on the local site. By 1986, this had been reduced to just over twelve hundred, in two phases of redundancies and reorganisation. Redundancies were both voluntary and compulsory; many were among white-collar staff, where levels of trade union membership and organisation were uneven. At the time of the case-study, technical staff in the company were represented by TASS; membership levels varied from 90%, in the drawing-office, down to 25% in the Automation section, where systems analysts and programmers were based. TASS represented staff on grades 6-10, who were almost all men. Women in the company were mainly concentrated in clerical posts, on grades 2 and 3. The TASS branch did recruit some clerical workers during 1985; however, this was blocked by APEX, and the two unions then entered into discussions to resolve the situation.

Meanwhile, one of the typist/wordprocessor operators I interviewed commented:

"There's not much of a trade union for our grades. The last lot of redundancies, in September (1985), effectively wiped out our union committee, so now there's no representation."

(Pam Phillips).

However, shopfloor workers, belonging to the AUEW, were in a somewhat stronger position. During 1985, senior management had attempted to introduce computerised systems designed to transmit drawings straight from the drawing-office to the shopfloor. The initiative ended in stalemate, when AUEW members refused to cooperate. Nevertheless, the implications of the use of CNC and CAD/CAM systems on the site was not to be underestimated. Reflecting on developments in the company between 1984 and 1986, one manager commented:

"We're still turning out the same volume of work, but with 80% of the workforce."

(Derek Jenkins, Buying Manager in the Procurement department).

Management and trade union representatives whom I met all described management's aims, in computerising, as being increased control and increased flexibility in the use of plant and employees. The company always takes on surplus contracts, and subcontracts these - carefully monitored - to smaller firms. The performance of these firms, and

their outstanding commitments to East End, are also continuously monitored. This is where the Procurement Department, and its recently-developed computerised system, come in.

6.1.2 The Procurement Department:

Until 1984, East End was organised in divisions - manufacturing, sales, automation and so on. Each division had its own purchasing section. Then the divisional structure was brought to an end, and the previously separate purchasing sections were combined in a new Procurement Department. At the time of the case-study, twenty five buyers, expeditors and procurement engineers were employed here, occupying desks spread through two thirds of a long room. All were men, except for one woman buyer.

The walls above their desks exhibited a prominent array of very explicit calendars. At one end of the room, the Buying manager and Procurement manager (both men) each had a small partitioned office. At the other end, six women clerical workers worked at two rows of desks. The typing and word-processing section (with six women staff) was based in a small adjoining room.

My initial visit to the department was a high-speed tour conducted by Derek Jenkins, the Buying manager. He introduced people by their first names as we passed, commenting that he encouraged an informal approach:

"We like to get everyone together from time to time, get them to speak their minds."

However, this was clearly a particular kind of informality, since Derek added:

"It's a bit like a military regime - we change everyone around from time to time, shake them up a bit, get them out of their ruts."

Derek considered that there had been a degree of reluctance initially, in relation to the Procurement computer system, on the part of some staff; however, his view was that this was no longer a problem.

During my initial visit, I interviewed the Procurement manager (Ron Hudson) and the Information Technology manager who had overall responsibility for the computerised Procurement system (Matthew Ingham). Derek Jenkins was delegated to make arrangements for the in-depth interviews in Procurement. He arranged for me to interview three of the men in the department: Ray Woods, senior procurement engineer; Paul Thompson, senior buyer; and George Innes, head of the expediting section. (I did not have the option of interviewing their less senior colleagues). All three were married with children; they had worked for East End for fifteen, thirty three and twenty seven years respectively. All three were originally apprentice-trained in engineering, and had worked their way up to their present positions through a number of posts and departments. Ray and George had several years' experience of purchasing and procurement

work; they both emphasised the varied nature of their jobs, and the challenge of using detailed knowledge gained from shopfloor experience to tackle problems. Paul, in contrast, had been moved to his present post during the period of redundancies and reorganisation two years previously. Before this, he had worked from purchase orders, and had not found the transition to his present post easy, as it involved working from manufacturing drawings.

In the clerical and word-processing sections of Procurement, I interviewed four women, all aged under thirty. (Of these, the first was suggested by Derek Jenkins; however, he left it to me to arrange the remaining three). Susan Stone was a VDU operator, described to me by the Buying manager as *"having done a lot of the system testing"* in Procurement. At twenty two, she was one of the youngest staff there. She had been upgraded to her VDU operator post (grade three) from a basic clerical grade, having joined East End as a clerk-typist in 1982. Louise Edwards started at East End on a training-scheme when she was sixteen, in 1977. Her father had worked for the company all his life, on the shopfloor; her mother worked in the contracts department, and two cousins worked for the company too. Despite her length of service, Louise had remained on the lowest grade of all the clerical workers in Procurement, having applied for regrading over a three year period without success. Neither Susan nor Louise had children; Susan was single,

while Louise married in 1985.

6.2 The Computerised Procurement System:

Matthew Ingham (Information Technology manager) described the Procurement project as "*a cornerstone system*", enabling the balance between work done on company premises and work subcontracted out to be constantly monitored and adjusted. This was achieved by bringing together information which was previously either cumbersome or impossible to assemble and update, concerning the progress of contracts both within East End and in its subcontracting companies. This information could now be accessed by staff in Procurement, and elsewhere in the company, both on-line at the VDU and through printouts. The system documentation, written by Matthew Ingham, described the system as menu-driven, designed to offer a selection of options related to user requirements. Users ranged from a clerical worker in Procurement, adding details to a file, to technicians or managers in other parts of the company, wanting to check on the progress of a contract.

In practical terms, data was first entered about a particular contract in the drawing-office, where a new member of staff had recently been appointed to interpret the relevant information from completed drawings. A bundle of drawings, along with a computer printout summarising basic details, was then taken to Procurement; here, clerical workers logged in its arrival on a manual

card-index. They then passed the details on to the Buying and Procurement managers, who allocated specific tasks within each contract to different members of staff. Each buyer was responsible for ordering a particular range of items; once ordered, the expeditors were responsible for checking that these were obtained and despatched with the appropriate deadlines. Procurement engineers dealt with equipment that had to be manufactured, inside or outside East End itself.

When tasks had been allocated in this way, the paperwork for each contract was returned to the clerical staff. They organised and filed information on each contract accordingly; they updated it when buyers, expeditors and procurement engineers reported progress; and they provided printed reports about the position of contracts, work outstanding from subcontractors, and the current responsibilities of staff in Procurement. Before the computer system was developed, information about the progress of each contract was entered on large cards, update by hand. There was no straightforward, consistent method of storing up-to-date information about the performance or current commitments of other companies, or of individuals in the department.

The most intensive users of the Procurement system were three of the women clerical workers, inputting data and getting reports printed out. They also called up information on the VDU for buyers, expeditors and procurement engineers, when the latter were reluctant or

unable to do it themselves at the three terminals which are available for this purpose. Finally, authorised individuals in other parts of the company could also access the system at their own terminals, and extensive use was made of this facility. To quote one senior manager:

" People used to talk to each other. Now they use screens instead."

As mentioned above, Derek Jenkins (Buying Manager) described computerisation as crucial to East End, both in order to maintain output with a significantly reduced workforce, and to facilitate subcontracting and the optimum use of resources. However, his view of the procurement system itself was quite mixed:

"I wouldn't say it's made us more efficient... well, that's not quite right. Throughput isn't any faster, but people are much better-informed." Derek had observed the development of computerised systems in manufacturing, where he quoted the example of a two week manual design and testing process having been reduced to an hour. He had expected throughput in Procurement to double, and day-to-day control to improve in ways that had not materialised. He commented that it had proved difficult to get staff to comprehend the nature and the implications of the new system. For instance, he described expeditors and procurement engineers as continuing to circulate printed documents to each other, even though the same information could be recorded and exchanged on the system.

6.3 The Procurement Development Process:

In general terms, the Procurement system had been developed with a prototyping approach, using a Fourth Generation language of the kind referred to in Chapters Three and Four, and housed on a mainframe-based network within the company. *"We didn't really use a methodology"*, as the IT manager, Matthew Ingham, commented with a smile. He had been responsible for carrying out the most intensive development work - a fact which highlighted the importance of the system to the company - and had chosen to do this in close and active collaboration with Susan Stone, a VDU operator in Procurement.

Matthew described the systems development process as having been relatively smooth, although restricted funding had made it necessary to carry it out in phases over an eighteen month period (completed in early 1986). His view was that this was a good example of the prevailing approach to systems design at East End: that is, *"for people to identify their own needs"*, sometimes using spreadsheet software, and in discussion with systems designers. He also saw his own experience and knowledge of the company, gained over ten years' work there, as crucial:

"I don't think I would have attempted this without that experience."

Bearing out the research discussed in Chapters Three and Four, Matthew contrasted the informality of the current approach with the computerisation projects of the 1970s, when systems consultants were engaged to produce

specifications for user departments. He felt that this formal approach had proved inflexible and unsuccessful, very much in the ways indicated by Land et al (1983) and Friedman and Cornford (1989). Among other projects, an attempt to computerise procurement processes had failed during this period.

George Innes, senior expediter, had in fact taken part in this attempt, and his comments supported Matthew Ingham's: *"We were left debugging the system at weekends. We'd got about 60% of the information onto the computer when management decided to call a halt; then it had to wait another fourteen years."*

Reflecting on that experience, and having observed IT developments in other companies, George continued:

"I'd seen the benefits of having all that information at your fingertips. I took it as a personal challenge to make sure the new system worked. it was a case of checking that others put proper information in: the computer is only as good as the information that goes into it. Initially a certain bias against it made things a little difficult. But I feel we overcame that."

However, while George Innes had put a great deal of effort into verifying the data which went into the Procurement system, he played no active part in its design and development. The only member of staff who did was Susan Stone, the VDU operator; she welcomed the opportunity, contrasting it with her early experience at East End:

"At first I was booking in drawings, it was mundane and horrible, Then the rumour went round that they were developing a computer system. They asked me if I'd like to help develop a computerised purchasing system, which I couldn't wait to do."

Susan had originally been trained in word-processing at East End; however, her work on the Procurement system depended on experience rather than any further, formal training:

"Every time Matthew developed something, he would ring me up and ask me to try it out - it was just trial and error... but I had purchasing experience. A lot of people find it hard to understand the system if they haven't been through the purchasing routine... It was very interesting, because I was involved. It was up to me to see Matthew; they (management) just wanted to see the end result. With the meetings, I was allowed to sit in and voice my opinion."

Susan's contribution was not confined to testing systems features, but came to include making a number of practical suggestions. These included changes in the times in the week when particular data would be entered and processed; improvements to screen design; and alterations to the software, so that some contract details were actively checked by women clerical workers as they entered them, rather than being automatically accepted or rejected through 'idiot-proof' safeguards built into the system,

such as fixed field lengths.

Once the system came into full use, Susan's role included teaching Procurement staff how to use it, and mediating during occasional crises:

"When it crashes, I tell them - Matthew doesn't. I go and tell them that we've lost the information, and we'll have to do it all again..."

This, like the active collaboration with Matthew Ingham, continued to provide welcome job satisfaction to Susan. Her own plan was to complete a BEC HNC, for which she was currently studying on day release. However, she recognised a degree of ambivalence on the part of management in Procurement, towards this expansion in her range of activities: *They involve you totally - Matthew says 'come and have a look at this.' Sometimes Ron [Procurement Manager] gets a bit infuriated, he doesn't like to think we're wasting our time... and it can be difficult, being off every Wednesday on day-release, no one else it. He grumbles, he'll say 'oh, have you been to playschool?' But he's very good, he lets you go; it's just a joke..."*

Considerable tensions are hinted at here, between the requirements of formal managerial control and those of flexible and effective information systems design. This bears out Friedman's observations (1989), about the disadvantages of 'direct control' management styles, particularly in relation to the development and use of

complex information systems. But in the short-term, Susan clearly recognised her own contribution to the procurement systems development process, and the unusual nature of the opportunity:

"I'm one of the lucky girls on the site, being given the chance to develop a system, rather than just inputting."

6.4 The Procurement System in Use:

Experiences of the procurement system in use varied, with those of the three men interviewed contrasting, in a number of respects, with those of their clerical colleagues.

6.4.1 'A Massive Filing-System...?'

All three men interviewed stated clearly that the more comprehensive and up-to-date information provided by the system represented an improvement on past facilities. However, their specific comments were more mixed. Ray (senior procurement engineer) commented that the proliferation of paper the system produced was the biggest problem: bundles of printouts which he had to organise and file carefully, "so that you don't have to start and go into the computer." When I asked him about this reluctance to 'go into the computer', he described his

frustration at the delays caused by security requirements and slow response times:

"All you really want is a button that says 'bang' and get to what you're looking for. Once you've asked for some information, it may be two or three minutes, you could wait ages for it. What we tend to do is just walk away and wait for the beep coming up."

As three terminals were shared by some twenty five buyers, expeditors and procurement engineers, a further problem could crop up when a phonecall interrupted someone in the middle of an on-line enquiry, and he or she left the terminal without logging off. This then prevented anyone else using the terminal, and there was no indication of who the interrupted user had been. In contrast, using the old, manual system to check on a contract's progress had involved a walk to the filing-cabinet and a glance at the relevant card. Ray concluded:

"The computer is only quicker when it's shifting a lot of hard information - like producing personal hard copies of reports. Then it comes into its own."

However, ironically these piles of hard copies also represented the filing and organising problem Ray had remarked on earlier.

George Innes (senior expeditor) also found the slow response times frustrating, although for him they did not outweigh the improved range and quality of information available. This made his attendance at a number of meetings unnecessary, allowing him more time to visit outside firms and suppliers.

Paul Thompson, senior buyer, found reports generated by the system useful too, but also commented on some unexpected limitations. For instance, the system had not removed the need for him to consult drawings. His attitude to the VDU was unambiguous:

"On the rare occasion when I need to raise a query which the computer would answer, I'd ask one of the girls to do it. I think once you get to a certain age, you don't want to assimilate new knowledge. I'd probably make three or four attempts before I'd get it right. They can flash it up in seconds."

None of the three men interviewed felt that the new procurement system had had, or would have, a major impact on their work. Work was still seen as revolving around phonecalls, site visits and problem-solving. The arrival of the system had not prompted the three men to perceive a need to develop keyboard skills, or any more general familiarity with computers. (None used a home computer, although all mentioned a son or a nephew who did so. George Innes had briefly experimented with one, but had found it *"almost beyond me"*, particularly since the only space in which to use it had been in the family living-room).

Instead, the patterns of work organisation which predated the system had remained in place (c.f. Webster, 1990). A firm boundary remained intact, between skills defined as technical or professional (exercised by the men in the department) and those defined as clerical (exercised by

women). In fact, the arrival of information technology had intensified the reliance of men in Procurement on their women clerical colleagues, to provide fast access to accurate data. Although Paul Thompson (senior buyer) was the most explicit of the three men about the ways in which male staff in the department relied on clerical support in connection with the system, it was also reflected in George Innes' emphasis on the importance of accurate inputting. And when I asked him how files were updated or amended, his immediate response was *"best ask Susan"*. Summing up, Ray Woods (senior procurement engineer) revealed how a system which was a 'cornerstone' for senior management had become totally identified with clerical functions, and with the women who carried these out:

"It's the same system as we've been using for many a year, no calculations involved, the girls do all the inputting... we're just using it as a massive filing-system."

In this view, the new Procurement system was very much a static element - not the increasingly important communications channel referred to by Matthew Ingham (IT manager) and by other senior managers. This suggests that it was not a generalised unease with, or resistance towards, new technology which had contributed to the underuse of the system described above by Derek Jenkins, the Buying manager. Either of these reactions would have been somewhat surprising, among men who saw themselves as familiar with, and interested in, products and processes which could be seen as technical. However, this is the

point: the new system was not seen as something technical, but primarily as clerical: limited, routine. As we will see below, the women who used the system intensively provided a contrasting perspective, and one which had more in common with the judgements and the long-term plans of senior management at East End.

Interestingly, Ray Woods (senior procurement engineer) was prepared to speculate about the developments he would have liked to see, in terms of the system:

"The biggest problem is the keyboard. If we could have, for instance, a voice-oriented VDU, it would be an enormous improvement. Really it's archaic, a typewriter. It seems so silly that we've got to type all this information in. Or if you could feed a drawing in, to something like a Fax machine that could read, and transfer all that information into computer records, that would be superb."

In some senses, these comments anticipated the long-term commitment of senior management at East End to the further integration of information systems, as illustrated by their unsuccessful attempt to computerise transmission of drawings from the drawing-office to the shopfloor in 1985. But Ray's comments were primarily addressed to the 'front end' of the procurement system - the need to type in information - rather than to the new facilities it already offered, it to its potential in its current form. In referring to 'a voice-oriented VDU', Ray was conjuring up an image of technological sophistication which was likely

to remain out of reach at East End for the foreseeable future - although if made available, such facilities would have major implications for a department such as Procurement. His comments did not touch on these issues; what they appeared to do instead was to reinforce his implicit association of the Procurement system with characteristics which he connected with women's rather than men's work in the department: static, labour-intensive, 'archaic'.

6.4.2 The System: a Cornerstone?:

Both Susan (VDU operator) and Louise (clerk) described how the old manual system in Procurement had become "a bit of a mess", particularly when the various different purchasing sections were brought together in 1984. Both viewed the computerised system as more efficient and comprehensive. Louise commented:

"I can honestly say that it's a much better system. it had its hiccups at first, because there's a lot to read into the order - what item could have meant what, you get mistakes and wrong numbers. But now all the prices and values are available, it's much better."

Some work was still done manually: a certain amount of filing, and the splitting of paperwork relating to different tasks within a contract. Louise and Tina (a third clerical worker) shared this work; each worked one week at the VDU and one on 'splitting and filing'. They had chosen this arrangement as one which both seemed fair,

and which provided a break from terminal-based work. Alison worked all day at the VDU, and was the only clerical worker in the department to have been regraded as a VDU operator (at the Procurement manager's instigation). The three women took breaks from the terminals as and when they could, depending on the pressure of work, rather than having formal breaks.

Although Susan had been invited to help develop the system, while Louise had simply been required to use it, there was a similarity in how each had approached the change. Louise commented:

"At first, it's be five years I'd not touched a typewriter - you know, you're bleeping, it was a bit frightening. But I thought 'I'm going to get involved to prove that I can' [my emphasis]. If I hadn't, what would there be on my job to do?"

Susan spoke in almost the same terms:

"When Ron gave me this opportunity, I had to make him realise that I wasn't kidding. I had to prove it [my emphasis] to myself and him. It gave me confidence that I could do something."

Just as taking the opportunity (albeit limited) represented by the new system had meant the need to 'prove' that they could cope, actually using the system was seen by both women as quite demanding. Susan commented on the satisfaction she got from resolving queries, liaising with Matthew Ingham, and teaching colleagues to use the system. Both women emphasised the

importance of organising their work carefully, and of maintaining a high level of accuracy when reading and inputting data:

"On this job, you do have to still think. It's not just a case of copy-typing, because on orders you have to work prices out, you have to get the total order values. You have to be constantly on the alert, because some people forget things - you've got to remember things. So that side of it's good: you've got total responsibility, which I like."

(Susan).

"Everything stems from this side of it, the clerical side, and ends up back here. We still have to find the hiccups and correct them: if we didn't, who would spot it?"

Concentration, both on immediate tasks and on the overall organisation of work, had to be sustained in the face of many interruptions and fluctuating demands; in addition, a certain amount of diplomacy was clearly required, for instance in pointing out errors in calculations made by male colleagues. Susan commented:

"It's your approach. If you have a bit of a joke... I've always tended to try and be on the nice side. Some of them find it hard to adapt, they've done it their way all these years. That's when you've really got to be patient, it was terrible at first."

In contrast with their professional, male colleagues, Susan and Louise both anticipated further radical change at East End:

"I believe in the next two to five years, if they've the money, they'll be bringing in more systems to control paperwork. Definitely I think they'll need fewer people. Without the system going wrong, there's been many a day, over the last month, when we've been scratching for work. You can't believe it really, we used to be swamped out with it. But whether it'll be the women sitting there, putting everything into the computer, is yet to be seen. You feel there's more men involved, and there's always men at the top."

(Louise).

In fact, both women felt very critical of the lack of opportunities for women in the company; Louise continued: "We don't get recognised down here, we never have done. I think they think 'it's a load of lasses...' It's a total wrong attitude. As a department, it could work a darn sight better, if people worked together."

Following up this comment, I asked Louise whether she thought that women and men saw these issues of communication and organisation differently:

"Yes, you do - but then don't be chauvinist and say 'a woman's recommended that'. Recognise that it's a good system or a good method. Women are more organised than men, that's why you get more clerical women. Blokes are more technical-minded: most men would be honest about this. If so, and there's a system to be devised from paperwork, then let the women take charge of it. Yes: it stems from your home. If you're organised at home, you'll

get organised in an office."

Here, Louise was not arguing for a major change in a gender division of labour which was taken for granted. But she was arguing for greater recognition for skills and for experience conventionally acquired by women (c.f. Gaskell, 1987). Domestic labour, in this context, represented not only burden, obligation or hard work, but also a source of important organisational skills. (The Women Into Technology campaign material, referred to in Chapter Two, provides one recent example of the ways in which this view is gaining some recognition in education and training contexts). In fact, having married the previous year, and recognising the lack of opportunities at East End, Louise hoped to have children and to leave the company soon:

"I'm probably one who's never been career-minded. I'm a family girl, I come to work for money."

At the level of having to accept an unwelcome situation - the lack of recognition for work into which she put considerable effort - Louise made a separation between 'being career-minded' and 'being a family girl'. However, in her earlier descriptions of her job and of the skills required, she had linked work and household, rather than separating them - referring to the ways in which many women bring the skills of 'being organised at home' to their office employment (c.f. Davies and Rosser, 1985).

Although Susan's recent experience of working on the

Procurement system had been much more positive than Louise's, her view of opportunities for women at East End was equally pessimistic:

"It's very much a man's company. All the higher-grade jobs are for men. You know when they're advertised, even though it doesn't say - you know for a fact that a woman's not going to get it. Obviously, I don't see myself here in several years' time."

Realising that the systems development work which she had enjoyed in Procurement was coming to an end, Susan had applied for a similar post in the Accounts department, where another new information system was under development. To her disappointment, it had gone to an external applicant. She reflected:

"It's unlikely to change. I've made a rod for my own back, in one way. Your movement's not that free round the company: he [Procurement manager] doesn't want to lose someone who's making the system work. In some ways, they force women out of the company; women get as though they don't want to try."

What Susan really wanted was the opportunity to learn computer programming, building on the interest and the experience she had developed. Meanwhile, she intended to complete her BEC course, regarding it as essential to get some qualifications before contemplating marriage or children.

From the preceding descriptions, we can identify a wide range of skills being used by Susan, Louise and their

clerical colleagues, in connection with the Procurement system. Firstly, in terms of systems development, Susan's skills in organising information, and her detailed knowledge of purchasing procedures, had contributed to software design, screen layout and the organisation of data input. Subsequently, her social and communications skills had enabled the IT manager to rely on her to handle crises, such as systems crashes. Both these skills, and her experience in purchasing, equipped her to support or to informally train professional colleagues in relation to the system. Matthew Ingham (IT manager) had viewed these contributions as sufficiently important to justify generating a degree of friction with the departmental management, who expressed considerable ambivalence concerning an expansion - even at an informal level - in clerical roles.

Secondly, in terms of day-to-day use of the system, both Susan and Louise described a range of discrete skills which they felt were essential to its success:

- fast and accurate keyboard use;
- fast and accurate reading and checking of documents;
- flexible but systematic organisation of tasks and workloads;
- sensitive and rapid responses to queries about the system;
- teaching others to use the system, on an ongoing basis;
- liaising with people at a range of levels: the IT manager; departmental management; procurement colleagues.

Two themes recurred in Susan's and Louise's accounts of their work. Firstly, the need to 'be organised': not reducible to the operation of a formal system, but dependent upon maintaining a flexible balance between fluctuating demands and interruptions. Secondly, they described their role in facilitating tolerable office relationships and communications. Thus, senior colleagues' errors were dealt with tactfully; it was 'just a joke' when the departmental manager referred to day-release training as 'playschool'. And those extremely explicit calendars lining the walls above male colleagues' desks: *"generally we can take it in fun, make a joke out of it."*

This combination of some quite specific skills with others of a 'social' and partly tacit nature matches analyses proposed by Scandinavian researchers on office systems development (Olerup et al, 1985). It also bears out the suggestion made by Davies and Rosser (1985), that women clerical workers commonly exercise a 'female office management function', which has come to be based partly on the skills and experience women acquire outside paid employment. At East End Engineering, increasing use of computerisation appeared to have made this function more important rather than less, although there was no concomitant change in clerical status or recognition.

In general, then, this range of clerical skills and experience remained unrecognised in pay and grading within the department (and within the company as a whole).

George, the senior expeditor, emphasised the importance of accuracy in inputting, and Paul - relying on 'the girls' to handle the VDU for him - felt that *"they should get more recognition."* Ray was the only one of the three men interviewed who made no direct comment about clerical support; yet its importance was implied in all the aspects of the new information system which he personally found difficult: using the keyboard, organising printed records and coping with interruptions.

To summarise, neither Susan nor Louise doubted their own ability to learn about and to use a new computerised system. In Susan's case, taking part in the systems development process had brought increased confidence and the desire to learn formally about programming. This was despite a context in which there was no formal training or support regarding IT, and in which both women felt they had to 'prove themselves' to somewhat critical or ambivalent male managers. Neither woman had any contact, encouraging or otherwise, with computing outside work. Both described their work as being more complex and more demanding than pay levels, grades or job descriptions reflected. Neither expected opportunities to improve at East End, for women. In this context, Louise saw the possibility of leaving work to have children as a positive alternative, even though not a simple one. In contrast, Susan hoped to gain access to better employment opportunities outside the company, by getting further qualifications.

6.3 Typing and Word-Processing: IT in a Different Context:

The day I visited their section, Denise Burns and Pam Phillips and their four colleagues were getting used to some new electric typewriters, equipped with screens and memories. Our discussions were punctuated by humorous or exasperated exchanges, as the women offered each other suggestions about how to get the machines working properly. Later, each interview took place to the accompaniment of the clatter of five machines operating at high speed in a small room.

Although three women worked at typewriters and three at word-processors in this section of the Procurement department, the installation of the new machines meant that the work was becoming increasingly similar. No general clerical duties were carried out here, and nor did the women have any contact with systems development or decision-making processes concerning IT (or any other aspects of company policy). The section was part of an IBM-based network; eight small word-processing centres had replaced typing pools across the company. Work could now be distributed and shared both between individuals and between centres. Louise, in the main Procurement department, had observed a reduction in the clerical workload, with the introduction of the new system there. But in the typing and word-processing room, processes of rationalisation had combined with the introduction of the IBM network to intensify the pressure of work. Changing

expectations on the part of document originators had played a part here:

"Before, they'd only make slight alterations. It's big changes now. There are problems with one or two people. You just have to accept it, I mean you don't mind doing it..."

(Pam Phillips).

In general, both the women interviewed found the wordprocessors easy to use - *"very much like a typewriter, not too much coding"* - and liked the good presentation they could achieve. Problems included a lack of adequate training, and high expectations from managers who underestimated the skills and effort required in wordprocessing:

"It is difficult at first. They don't credit the intelligence you need. They just gave us the new machines [terminals] and the very first day I was given a twenty page document to drum up."

(Denise Burns).

There had also been a degree of deterioration in working relationships and in some specific skills. Denise continued:

"You lose personal contact with your boss. The lads in there [Procurement] haven't got time for dictating, it's mostly audio now. I'm losing my confidence about shorthand - if I had to do it, I would, but I wouldn't be happy about it."

Stress and tiredness were additional problems, for more prominent in this section - where staff worked all day at

terminals or typewriters - than in the main Procurement department. Time for breaks depended on the pressure of work. Staff had six monthly eye tests, but the tiredness, combined with some unease about the effects of intensive VDU use, were the main issues:

"We work better in a morning than in an afternoon. Sometimes you go home and your head's really buzzing. You keep hearing things about VDUs, though nothing's proved - we might know in twenty years. You certainly get more headaches; it's a different sort of tiredness."

(Pam Phillips).

Pam and her colleagues had persuaded management to provide document holders, window blinds and improved lighting; taking documents back to originators personally provided an informal opportunity for time away from the machines. In terms of more fundamental concerns, Pam and Denise expressed views very similar to those of Louise and Susan in Procurement. Both would have liked further training about the potential of IT, but neither expected this to be forthcoming:

"You don't get the better grades of job for women. There's just nowhere for the girls who're trained on computers to go."

(Pam Phillips).

"It's not equal opportunities here. If a man were doing this, he'd get a lot more."

(Denise Burns).

Both women linked their comments about their own future

prospects to their assessments of likely changes within the company, in the direction of integrating computerised systems:

"They may try to put more work onto the computer, which would take a whole new rethink. It may start from simple orders. I think the idea eventually is to have all the computers tied up. I could envisage that we would all be sitting at terminals all day, all doing the same work. There'll just be the odd secretary, for the boss. I'm not that keen; it would be like going back to typing pools."

(Denise Burns).

Denise saw the company as facing increasingly fierce competition, partly from engineering firms in China and in Latin America to which it had sold plant and software over a long period. In this context, she expected any further developments in office IT to facilitate further rounds of rationalisation and redundancy.

To summarise, both Denise and Pam felt relatively pessimistic about the current and prospective changes in their working conditions and opportunities. Wordprocessing was seen as facilitating better presentation of documents; but job content and satisfaction here were far more restricted than in the rest of the Procurement department. Within these constraints, women in the typing and wordprocessing section still exercised a degree of discretion and skill in the ways in which they shared and organised workloads; they also supported each other in installing and learning

to use new systems and equipment. They accommodated pressures, interruptions and rising demands, feeling the effects in the form of increasing stress and fatigue. These were 'skills in the person', rather than skills built into the job, in Cockburn's (1983) distinction: skills which facilitated work in some respects, and helped to make it tolerable in others. While they did not condone such conditions, they did not feel that alternative prospects were in view either - whether at a collective level or a personal one.

6.5 Discussion:

I now return to the two central themes outlined at the beginning of Part Three: firstly, a critical discussion of systems development practices, and secondly, the area of women clerical workers' skills, experience and opportunities.

6.5.1 The Systems Development Process:

Firstly, the interview accounts presented above provide an illustration of the trends towards greater flexibility, and towards increased user-involvement, discussed in Chapters Three and Four (see for example Friedman and Cornford, 1989). The senior IT manager whom I interviewed perceived a clear shift in company practice, away from formalised systems development methodologies, and towards an increased reliance on the participation and the skills of company employees, captured through a prototyping approach. Bearing out an increasing range of analyses,

the emphasis was on integrating user or business experience with the processes of designing, testing and refining the software itself - rather than on making either 'technical' or 'business' (organisational) concerns dominant. (Bjorn-Andersen, 1987; Willcocks and Mason, 1987). Developing this kind of approach depended both upon the emergence of managers and staff who could bring together business and computing skills and interests, and upon the availability of software (Fourth Generation languages) which was relatively easy and flexible for non-programmers to understand and use.

At a day-to-day level, this approach had a 'design by doing' basis - an active partnership between key designer and key user - reminiscent not only of other prototyping examples, but also of the innovative Scandinavian projects discussed in Chapter Four (Bjerknes et al, 1987; Ehn, 1988). The major difference was that - in contrast with these Scandinavian projects - the initiative remained firmly in the hands of the senior IT manager, in his role both as designer and project leader. There was no broader commitment to improved working conditions or opportunities for the users involved.

Secondly, in contrast with the surveys cited at the beginning of Part Two, the outcome was a system installed on time and within budget, and acknowledged by all in the Procurement department (and by others in the company) as a significant improvement on past practices. The system incorporated the requirements both of senior management

and of other users, including clerical workers; for example, it provided rapid access to information on subcontracting patterns, and also contributed to clerical job satisfaction, rather than undermining this. Although clerical workers had observed a streamlining in procedures, this had not saved time, or labour, on the scale departmental management had originally hoped.

Thirdly, however, some tensions were evident in connection with this broadly successful information systems design process. The senior IT manager responsible for designing the system stressed the importance of flexibility, and of encouraging users to articulate their own needs, in discussion; in the Procurement example, the user whose participation he had identified as most crucial was a junior woman clerical worker. Pursuing this approach required a shift towards a 'responsible autonomy' style of management, and away from the 'direct control' style which had both been typical of East End during the 1960s and 1970s, and had characterised the process of restructuring and rationalisation which took place in the mid-1980s. (Friedman, 1989). Departmental management appeared to tolerate this shift, but with considerable ambivalence. The degree of flexibility or responsible autonomy seen as important by the senior IT manager could not be said to have been integrated at all thoroughly within an overall IT or business strategy within the company. This points to the likelihood of continuing tensions between different sections of management, caught between the commitment to continue processes of rationalisation through

confrontation with a partially well-organised workforce, and the commitment to further integrated information systems development, which would depend somewhat on the active consent and cooperation of some employees. This picture has some parallels both with Feldberg and Glenn's analysis of the paradoxes raised for management by processes of office automation, and with more recent accounts of tensions between IT professionals and managers within financial services (Feldberg and Glenn, 1979, discussed in Chapter One; Knights and Willmott, 1990).

Fourthly, the case-study tends to confirm the argument put forward by Webster (1990), that office information systems are shaped and constrained in important ways by the patterns of work organisation into which they are installed, rather than having a dramatic or determining impact in themselves. In the Procurement example, we can see a number of facets of the interaction between existing working relationships and the information systems development and implementation processes. In a positive sense, there is a small example of a challenge to common assumptions about the routine or degraded nature of women clerical workers' tasks and abilities: rather than having 'idiot-proof' checks built into the software, the accuracy of some aspects of the data remained to be checked actively by the women as they entered it, at their own request.

Less positively, the participation of a woman clerical worker as the 'key user' in design and testing processes

appeared to have limited departmental perceptions of the system, rather than expanding departmental perceptions of clerical skills and potential. The new competences developed by women clerical workers in connection with the procurement system appeared to have become easily 'taken for granted' within an existing gender division of labour, becoming assimilated into 'female office management functions' which received no formal recognition (Davies and Rosser, 1985; Olerup et al, 1985). For men in the Procurement Department to have associated the system with potential for fundamental change within the company, and within their own work, would have involved disrupting the strongly gender-related ways in which they were accustomed to perceiving 'clerical' processes - and would have involved seeing connections, rather than contrasts, between these and their own skills and activities. This tends to confirm the findings of Cockburn, for example, in her 1983 study of men in the printing industry (Cockburn, 1983). The long-term plans of senior management, to extend and integrate information systems across the company, suggested that the limited view taken by the men working in Procurement might be short-lived.

6.5.2 Women Clerical Workers' Skills and Experience in Connection with Systems Development:

Firstly, the East End case-study shows the kind of basis that can exist for clerical user-involvement in office systems design. Confirming research carried out in manufacturing contexts, it indicates that at East End

there was a degree of managerial reliance on clerical skills and cooperation, both in order to make the design process flexible and comprehensive, and in order to see through processes of testing, implementation, (informal) training and systems support (c.f. Kubicek, 1983; Williams, 1987). Both formalised and tacit clerical knowledge of flows and patterns of information use were required; so were specific skills ranging from keyboard use and checking of data to the management of tasks and working relationships. Office work of this kind, thus, does appear to offer skills and experience on which a 'human-centred' design approach might build, as it has done in craft contexts.

It also offers clear possibilities for constructing the kind of bridge or career ladder from clerical work to programming or other aspects of computing, proposed by business-oriented organisations such as the 'Women Into Technology' campaign (discussed in Chapter Two). Looking at the expanded range of skills and activities developed by the VDU operator in Procurement, it is easy to visualise how these might be incorporated into a 'systems support' or 'systems liaison officer' post - creating access to computing-related work and training within an existing area of 'women's work', and tackling equal opportunities issues partly through job redesign (c.f. Hales, 1988; Liff and Webb, 1988). The contrast between the main Procurement department and the word-processing section is instructive: in the latter, both the range of day-to-day activities, and the possibilities for

innovative change, were far more restricted. (This picture could change, however, with the greater integration of systems envisaged by senior management in the longer-term). It is important therefore, in terms of assessing the potential for 'human-centred' initiatives, to be specific when discussing 'office work'.

Secondly, however, at East End it was clear that none of these possibilities were likely to be explored. As I have indicated above, a flexible and user-oriented approach to systems design represented one trend within the company, but one which existed in some tension with the prevailing management style. It was not part of any wider strategy on information technology. Nor was there any commitment to equal opportunities, formally or informally, at East End. Clerical participation in creating and operating the new Procurement system had been a success; despite this, or perhaps because of it - as Susan, the VDU operator, suggested - that participation had become part of the entrenched gender division of labour, rather than opening up new opportunities. At the time of the case-study, East End was not experiencing any difficulty in recruiting or retaining skilled staff; on the contrary, redundancies had been taking place, among clerical and administrative staff as well as on the shopfloor. In this context, then, even the short-term opportunities for change, identified by organisations such as Women Into Technology, were not in evidence. The prototyping approach adopted at East End proved to be both successful

and rewarding - for users, managers and the key designers - within the short-term. However, such approaches make no claims to address wider organisational questions such as IT strategy or equal opportunities; and in this sense, they remain vulnerable to being undermined by factors such as internal management conflicts, or labour market inequalities.

Conclusion:

In the opening sections of this chapter, I described the development and use of a complex information system, through a prototyping approach. Confirming the results of research discussed in Chapters Three and Four, this flexible approach had drawn on the intensive involvement of a key user, working in partnership with a designer who also had extensive business experience and senior status in the company. The outcome was a system which met most of the stated requirements of its managerial, professional and clerical users.

In later sections, I examined the differing ways in which clerical and other users perceived the Procurement system. In contrast with the implicit emphasis in much systems development literature, the key users here were women clerical workers; their active involvement in the development and implementation processes had helped to ensure that the new system did not diminish clerical job satisfaction, in contrast with the situation in the typing and wordprocessing section in the department.

However, this involvement had taken place within an

entrenched gender division of labour; skills and knowledge related to the new Procurement system appeared to have been assimilated into a gendered clerical 'support' function, rather than taking on more explicitly systems-relating or computing connotations. The Procurement example, then, illustrates the ways in which social context can shape the perceptions of IT. It also illustrates the possibilities for expanding clerical jobs to include systems development and systems support skills and responsibilities. Although women clerical workers at East End Engineering could identify these possibilities, however, they were all too aware that in current conditions, the company would not offer conditions in which they could be taken up.

CHAPTER SEVEN:

'AN IRON CARTHORSE WITH RIBBONS':

OFFICE SYSTEMS DEVELOPMENT AT CITY LIBRARIES.

INTRODUCTION:

In this chapter, I move from a private sector context to a public sector one, focusing on processes of information systems development in 'City Libraries', the public libraries department of a major Northern city council. In section 7.1, I describe City Libraries in the context of policies on employment and on Information Technology within the local authority of which it formed a part. In section 7.2, I focus in particular on the 'Bibliographical Services' section, where a piecemeal process of computerising the libraries catalogue took place over a ten year period; this was one of the first sections within City Libraries to tackle computerisation. In section 7.3, I discuss the main features of this piecemeal information systems development process, and in section 7.4 I analyse Bibliographical Services' staff perceptions of using information technology. In section 7.5, I discuss the City Libraries example in relation to the two major themes introduced at the beginning of Part Three - analyses of the systems development process, and specific issues regarding women clerical workers' skills, experiences and opportunities. Here, I draw out some preliminary comparisons with the East End Engineering example, and indicate some themes to be addressed in depth in Chapters

Eight and Nine.

7.1 City Libraries in the Local Authority Context:

7.1.1. The Local Authority:

With a workforce of approximately 32,000 at the time of this case-study, the local authority was by far the largest employer in the area. The majority of the authority's employees were manual workers (17,500); teaching staff numbered approximately 7,000. This left some 7,500 employed in the 'Administrative, Professional, Technical and Clerical' (APT&C) grades. The majority of both manual and APT&C staff were women - 61% and 60% respectively (figures taken from an internal research report on women's employment in the authority - 'Positive Action for Women', 1984, unpublished).

In all grades, women were concentrated in the lower-paid jobs. The 'Positive Action for Women' report referred to above showed that 3,500 of the 4,500 women APT&C staff were on the four lowest clerical grades (scales 1 - 4). In contrast, 83% of the top 'Principal Officer' grades were filled by men. The authority was therefore a very important employer of women clerical workers in terms of numbers; it was also a potentially important focus of attention for equal opportunities initiatives designed to improve their position.

The pattern of employment in this authority typified local authority employment more generally, both from the point of view of its place in the national and local economy,

and from the point of view of women's employment (see for example Stone, 1988). in spite of the concentration of women clerical workers in the lower grades in local authorities, until the late 1980s such employment did offer a high degree of stability for women workers. Women's employment in local authorities had been increasing steadily since the 1950s (Stone, op.cit.); in addition, the terms and conditions of local authority clerical employment were relatively favourable compared with other sectors of women's employment.

In this particular City Council, an entrenched Labour Party majority had gone unchallenged for fifty years, apart from a brief one-year period. There was a closed-shop union agreement, and a high degree of employee support for trade union activity. During the 1980s, in common with a number of other large Labour-controlled local authorities, this Council established a range of radical initiatives. (Collective Design, 1985). These included the adoption of an equal opportunities policy in staff recruitment (1981); the establishment of a 'Paid Educational Leave' scheme for Council employees (1981); the establishment of a department to promote economic and employment policy development (1982); the establishment of a Race Equality Unit (1982) and of a Women's Unit (1986). The prevailing policies and trade union agreements in the authority, therefore, provided some considerable scope for equal opportunity and worker participation initiatives.

But these new policies were neither reflected in, nor

related to, Council policy on information technology. From the late 1970s to the mid-1980s, the main, formal feature of IT policy was a commitment to purchasing hardware and software from ICL, with a view to the eventual creation of networked systems between departments. This policy was enforced through the 'Information Technology Panel', composed of councillors. Informally, the Council Computer Services Division retained considerable influence over the scope and the outcome of IT Panel discussions. Crucially, councillors depended for advice upon computing professionals, and lacked any coherent or credible basis on which to broaden the terms of debate beyond the technical or financial details of particular departmental bids for new developments (Pemberton, 1986). For long periods, the IT Panel met infrequently; Pemberton's study described gaps of six to nine months between meetings between 1984 and 1986. Between meetings, essential decisions were made through the chairman, again in consultation with the Computer Services Division.

However, the ICL-only policy became increasingly unpopular in the mid-1980s, as managers and officers in particular departments became more knowledgeable and more aware of alternative hardware and software. Under pressure to control costs, the IT Panel began to agree a number of non-ICL purchases (for instance the acquisition of McDonnell Douglas systems in the Works and Recreation departments). Computer Services too began to address the

issue of communication with users and user departments; by 1987, decentralisation of the division was being planned (see further discussion in Chapter Eight). The IT Panel also began to devote more attention to this issue of training; in 1987, for the first time, a proposal was made to allocate up to 10% of every IT acquisition bid to this. However, the emphasis here was largely on management training in the effective use of IT, rather than on skill development or enhanced opportunities for basic-grade staff.

Industrial relations practice in the authority, in relation to IT, was directed by a new technology agreement ('Responding to Change') established in 1984. This was negotiated following a thirteen week strike in 1984, involving 630 'key workers' throughout the Council. Among these were the fifty women employed in the data preparation section, housed (along with Computer Services) in the Treasury. Coincidentally, these women were also one object of the 'Positive Action for Women' study cited above. That report, in which a number of stressful and unhealthy features of the working conditions in the data preparation section were described in detail, was presented to councillors during the strike.

The result of the Positive Action initiative, led by women council officers, was to focus both trade union and management attention on a previously neglected area of work done by women. Working conditions were significantly improved in data preparation following the strike. A

programme of decentralisation of data preparation was also initiated, intended to offer staff the opportunity to move to jobs in other departments which would combine data entry with a range of other clerical activities not involving VDU use. Thus, although NALGO policy remained formally reactive rather than proactive, in relation to IT (c.f. Williams, 1985), the data preparation example also raised job design issues. Working in partnership with other white-collar unions, NALGO has since developed further policy and training initiatives on job design in relation to IT (APEX, 1985; NALGO, 1988).

Within the framework of 'Responding to Change', the general policy of the local NALGO branch was to negotiate information technology issues in detail at departmental level. Circumstances therefore varied widely between departments, both in terms of how much information union members received from union representatives or from management, and in terms of working conditions. Relatively few women clerical workers were actively involved as union representatives; in many cases, staff at this level were represented by a man based in a different office, and on a professional or administrative grade. This was acknowledged to be a problem, by union branch officials whom I interviewed. In 1987 a 'Clerical Workers' Development Programme' was drawn up in the Central Personnel Department, with the collaboration both of NALGO and of the Women's Unit. This noted the lack of career opportunities for clerical workers, and outlined a number of areas for possible improvement. As will be

apparent in section 7.1.2 below, the Libraries department was able to develop these ideas further through their own 'alternative grading scheme'. However, in the context of increasing restrictions on local government spending, the development programme appeared to gain little active support elsewhere in the local authority.

To summarise, then, this authority has been a major and a stable employer of women clerical workers. Through trade union agreements and other new initiatives, a framework was developed, during the early 1980s, for considerable improvements to be made in working conditions within the Council. However, in the area of IT, neither policy nor practice has addressed itself directly to these issues. By the later 1980s, the political and economic constraints imposed by central government, in the form of rate-capping initially, had created a climate of considerable uncertainty within the authority. This was reinforced by the introduction, in 1989, of legislation to bring about compulsory competitive tendering for services traditionally delivered by Council departments. In this context, computerisation began to be perceived by an increasing number of departmental managers as an important means through which to sustain service provision within tight legal and financial limits.

7.1.2 City Libraries:

In public library terms, City Libraries was a large organisation: there were thirty six branch libraries, in

addition to a Central Library housing specialist reference sections, and the most heavily-used central lending section in Britain.

The department was small in the context of the local authority, however, with 522 employees at the time of the case-study; of these, 400 were library assistants (395 of whom were women). Both its size, and the 'leisure' connotations of the service provided, had caused City Libraries to be seen as somewhat marginal to political and economic developments within the city, in the past. This relatively low status had been reflected in an uneven and under-resourced approach to computerisation, begun in the early 1970s. By the mid-1980s, an off-line, batch-supported system provided some facilities, in some parts of the service: issuing and discharging books ('circulation control'), and an incomplete catalogue, on microfiche. The original bid for funding for these developments had included an undertaking from City Libraries' then director that four jobs would be 'saved' (lost) in return. This never materialised. In 1986, the Computer Development Librarian reflected that computerisation could be estimated to have 'saved' the equivalent of three posts. But computerisation had also speeded up book issuing and discharging procedures, so that long queues no longer built up in the busy Central Library. In this context, during the late 1970s transactions increased by 25%. No jobs were lost directly; instead, this rise in transactions was achieved

with broadly static staffing levels.

However, although computerisation relieved some difficulties in the Central Library, the patchy and unreliable nature of the system as a whole caused it to be seen universally as inferior to its manual predecessors - 'an iron carthorse with ribbons', as it was described by Alan Baird, City Libraries' research officer.

Then, in 1983, the appointment of a creative and confident woman Director marked the beginning of a process of change which both raised the library department's profile within the city, and increased the range and the volume of its services. Three aspects of these changes are particularly relevant to the question of the design and implementation of computerised systems in City Libraries.

Firstly, there was a shift away from the model of libraries and library staff as 'custodians' of books and other resources, and towards a 'community librarianship' model. This emphasised outreach work, cultural activities and a much wider variety of resources to be used and borrowed. Making this transition did require increased consultation by management with professional library staff. Some management team members also came to see increased use of computers as a priority, in order to facilitate a process of decentralisation, for instance by providing branch librarians with on-line access to their own budget information and ordering facilities.

Secondly, a number of initiatives were developed in order

to improve opportunities for the non-professional staff - almost all women - who delivered services to the public, and provided the associated clerical support. Traditionally, there has been a rigid distinction between professional and non-professional library staff, both in this public library and in library work in general. Non-professional staff, on clerical grades - library and information assistants - carry out a range of basic functions: issuing, discharging, renewing and reserving items for borrowers; shelving, stock-checking and repairing books; processing orders, invoices and catalogue records and amendments; registering new borrowers, and responding to library users' enquiries. In small branch libraries, the library assistant's role will include a considerable variety of tasks, and a high degree of interaction with library users. In contrast, in some Central sections - Administration, Bibliographical Services - there is no contact with the public, and the range of tasks is smaller.

However, in practice there has been an increasing overlap between certain aspects of library assistants' role, and that of their professional colleagues. At City Libraries, this has been the case both in local branch libraries, and in the busy central reference and lending sections. With the expansion in City Libraries' services referred to above, increasing demands were placed on library assistants, to provide a broader and more flexible service. Library assistants in central sections, as well as in branch libraries, were increasingly expected to

respond to some of the more complex public enquiries as well as those of a routine nature; for many, this became both the most satisfying and the most stressful area of their work. Originally proposed by NALGO in 1984, an 'alternative grading scheme' was taken up by management from 1985. Staff on clerical scales had originally been limited to grades 1-3, with the majority concentrated on grades 1 and 2. Under the alternative grading scheme, a process of annual interviews allowed progression to scale 4, and scale 1 was phased out. This offered the possibility of greater recognition and better pay, for non-professional staff whose duties and experience had come to overlap substantially with those of their professional colleagues. At the time of the case-study, the main problem with the scheme had been a lack of sufficient funding to allow all the staff who were entitled to regrading to obtain it.

Thirdly, a number of initiatives were developed in the area of gender and equal opportunities. City Libraries was never the 'man's world' described by the women at East End Engineering. 84% of City Libraries' staff were women - the highest proportion of any department in this local authority. However, a report produced by women Libraries staff in 1988, as part of an initiative on the part of the City Council Women's Unit, revealed a high degree of segregation on gender lines. It showed that one third of women workers in the department worked part-time, or as job-sharers; that is, roughly the same proportion as were

actively involved in caring for dependants - under-fives (6.22%); school-age children (20.4%); disabled family members (3.56%), or elderly ones (6.22%). More starkly, over 60% of women Libraries staff were on Scales 1-3; only 6% were on the senior grades - SO1 and above. The woman Director of Libraries was the only woman chief officer in the authority at that time; with the exception of one assistant director post, all remaining senior management posts in City Libraries were held by men. A survey carried out by the Library Association in 1988 confirmed the existence of similar patterns on a national scale. Based on an 80% response from the 20,969 members to whom questionnaires were sent, the survey found that men formed 27% of the workforce in libraries overall, but held 82% of senior posts (paid at over 20,000 p.a.). (Library Association, 1989).

Until 1985, men also outnumbered women on the Libraries NALGO shop stewards' committee. In subsequent years, this position was gradually reversed, but the chief shop steward (a male professional) pointed out that recent training and recruitment trends had undermined women's position in library work, in some respects:

"It used to be that most of the senior staff were women, who moved up through local libraries. Now we've got more people who have gone through the professional channels, and a higher proportion of men: that has worked against women, in the last ten years, particularly at

middle management level."

(Neil Jenkins, Chief Shop Steward and Deputy Section Head in Bibliographical Services).

The local report which summarised these inequalities also described a number of policy and training initiatives, designed to tackle them in some respects. These included provision for job-sharing; a network of 'policy development groups', and an active Women's Group, with scope to influence both service provision and working conditions; programmes of assertiveness training and management training for women; and an experimental 'male awareness' training programme for male professionals, looking into how sexist practices and assumptions might be articulated and challenged. Many City Libraries staff expressed scepticism about the scope of these measures, and of the other radical policies referred to above. Still, the changes summarised here show how City Libraries had come to take a leading role, within the national library context and within the local authority, in establishing innovative policies and practices.

7.1.3. Information Technology Provision and Policy:

In common with other Council departments, City Libraries had not extended its more innovative policies into the area of information technology. IT development had not been a specific priority for the new Director, Pam Chivers, who had preferred to delegate responsibility for this to two assistant directors and to the recently-appointed Computer Development Librarian, Phillip

Bradshaw.

Book-issuing and discharge ('circulation control'), borrower records and catalogue facilities were the basic features of computerised systems in place at City Libraries in 1986. A discussion paper produced by the Computer Development Librarian in 1986 summarised the position:

"In the longer term, there is an overwhelming feeling within City Libraries, based on experience, that future development of many of the current and potential applications of IT within the department will best be served by the acquisition of an on-line, integrated system. All of the shortcomings of existing systems stem from their being off-line, batch-supported systems. Public expectations of a computerised system, and the actual service delivered by an off-line system, present considerable differences.

From a staff point of view, off-line, batch-supported systems on balance generate more clerical support routines than are saved, since manual records of trapping, interrogations etc are required, as well as the necessity of calculating fines from charts. Friction is caused by disputes which cannot be immediately resolved because the necessary data cannot be accessed. In seeking mainframe support for the library system, the Libraries Department is in competition with other user departments, most of whom, by the nature of their service, would take priority.

An on-line, integrated system would overcome many of these problems, as well as giving the advantages of total integration of the various facets of the library service."

The succesful acquisition of an on-line, integrated library system would require the preparation of specifications and estimates within City Libraries, and then the submission of these for approval by the local authority IT Panel. Two Assistant Directors began drawing up an outline specification in 1985, and City Libraries management made a short presentation to the IT Panel in 1986, summarising their view of their future requirements. But City Libraries Director, Pam Chivers, was not optimistic about the capacity of the Panel to discuss broad questions of IT strategy; in fact, she commented:

"It's dreadful! It does nothing of the kind..."

The study undertaken during the early 1980s by Brigitte Pemberton, within the City Council, confirmed this view of structures and procedures concerning IT (Pemberton, 1986).

Taking plans further within City Libraries itself was also problematic. This process was supposed to be coordinated by an IT 'Policy Development Group'; but Pam Chivers and other City Libraries staff described this group as 'top-heavy' with senior management and professionals, who were already over-committed in other directions. The group never managed to meet regularly, and no draft specification was ever successfully completed by the two

assistant directors who had originally taken on the task.

As outlined above, then, the process of computerisation in City Libraries had been very uneven. Some branches and sections still operated entirely on manual systems, while in others, there was extensive access to computers for both routine and more specialised functions. One section in which staff had had experience of computerisation over a long period was Bibliographical Services (BS), where books are ordered, catalogued and classified, and allocated to service points. Provision of a satisfactory catalogue is fundamental to any library service, making it an important area in which to assess the success or failure of computerisation. Accordingly, the Bibliographical Services section is the main focus of the following sections in this chapter. In Chapter Nine, I return to City Libraries, and discuss other aspects of library computerisation in connection with the development of innovative systems analysis and design approaches.

7.2: Bibliographical Services and the Library Catalogue:

Four men and sixteen women worked in Bibliographical Services (BS) at the time of the case-study; two professional librarians - both men - were head and deputy head of the section. I interviewed both: Michael Harris, section head with thirty years of library experience, and Neil Jenkins, a professional librarian in his early thirties, who had worked in BS since completing his postgraduate library qualification, and was also chief

shop steward in City Libraries. Both were married with children. In addition, I interviewed Tina Bell and Catherine Smith, respectively typing supervisor and typist; both were in their twenties - Tina single, and Catherine married without children. Both had worked in BS for some five years. I also interviewed Gwyneth Evans, responsible for book-ordering, who had worked in BS for some twenty five years, and was single. Finally, I interviewed two trained cataloguers, both in their early fifties: Bill Wallace and Carol Finch. Both were married, with grown-up children, and had worked in BS for over fifteen years. As at East End Engineering, I also interviewed both management and trade union representatives at the beginning of the study.

The deputy head of the section had responsibility for cataloguing and classification of books and other items, working with a team of five cataloguing staff. The remaining staff in the section carried out the clerical processes associated with ordering and invoicing items, and with establishing and maintaining the computerised catalogue. However, a process of reorganisation had begun to diminish the differentiation between the two teams of staff. Most BS staff were on grades 2,3 or 4 on the AP&T scale; professionals were on grades ranging from 6 to S01.

Pressure for the creation of a computerised library catalogue came originally from the increasingly busy Central Lending library. Library staff recalled that the

line of cabinets housing the card catalogue had reached the point where it was hard to accommodate physically: it extended the length of the main lending area. Work on new systems for the catalogue and for circulation control began in the mid-1970s. By 1986, both were still incomplete. At this point, for instance, the circulation control system did not include either the two large and heavily-used reference libraries (which did loan some items), or the very busy Central Children's Library. The latter was still using the traditional 'Browne' ticket system, with which staff were experiencing major problems, as the volume of transactions continued to grow.

A microfiche catalogue finally became available in 1986, in the Central Library and in some branches. This was produced from the database housed on the Council mainframe, and was updated every three months. When new books were delivered to BS, cataloguing staff checked to see whether any of these items were already included on a 'Short Title File' (STF). Checking was carried out directly at terminals linked to the mainframe; there was no facility for on-line updating or amendment, however, although it was planned to make this facility available. If there was an existing record, a new location and accession number would be allocated to this. If not, an STF form would be filled in by hand, in BS. In both cases, details would be sent for later batch inputting by data preparation staff in the Town Hall Computer Services section.

Computer Services staff were responsible for matching new STF entries against catalogue records obtained on tape from the British Library; the aim was for matching entries to 'pull in' the full, detailed catalogue entry, to be stored and transferred to the local catalogue file. These would subsequently appear on the updated microfiche catalogue. However, if the new STF entries did not match British Library records in this way, a full catalogue entry would be written out manually on a form in BS. These would then be sent across to the data preparation section for batch inputting. These intrinsically cumbersome and time-consuming processes generated many errors, requiring BS staff to carry out repeated checks on printouts of matched and unmatched catalogue entries sent by the data preparation section.

7.3 The Systems Development Process:

Staff at all levels in City Libraries - including senior management - unanimously saw the systems development processes which had been initiated in the mid-1970s as "disastrous". These processes had been characterised both by a severe lack of resources, and by an almost total lack of consultation with prospective or actual users.

Budget constraints, combined with the City Council's then commitment to purchasing IT equipment from ICL, had originally led City Libraries' management to opt for a cataloguing system 'stripped off' from a larger library system used in another (rural) Northern authority in the

1970s. This system, which included basic circulation control (issue and discharge) facilities, was bought from Plessey (and was subsequently maintained by the firm 'DS' which was created after a management buyout of this part of Plessey in the early 1980s). Neil Jenkins commented:

"We did everything back to front, if you like. We started with circulation because there was a very great problem with Central Lending. But we realised when we took over the new system that we'd have to have certain major modifications done, which did away with quite a lot of what was good about that system. Ironically, what we're after now is an integrated system."

Thus there was no process of systems analysis, in the sense discussed in Chapters Three and Four: there was no investigation of detailed procedures or requirements before the 'stripped off' sections of an existing system were purchased. The computerisation process was conducted as a 'technical' exercise in the narrowest sense, with the emphasis entirely on writing new pieces of code to make the various elements operate at a basic level on the city council mainframe.

As Neil Jenkins pointed out, the original system had been developed for a library service dispersed over a large rural area; he did not find it surprising that adapting parts of the system to a heavily-used city library service had proved problematic. The limitations of this piecemeal approach were compounded by the narrow basis of the adaptation and redesign process itself. One professional

librarian - Jim Lodge - based in BS, acted as liaison officer between City Libraries and the Computer Services section. No other libraries staff were involved, at the crucial planning stages. Modifications to the 'stripped off' catalogue system were carried out by Computer Services staff, working with Jim Lodge on an 'ad hoc' basis, without reference to any specific design methodology. Shortly afterwards Jim Lodge transferred out of City Libraries entirely, and went to work for Computer Services full-time, but without any further contact with library-related work. This left considerable bad feeling:

"He more or less organised all this, and pushed it; then, as soon as it took off he moved across there (Computer Services) and we were left with all the problems. We weren't consulted in any way."

(Tina Bell, typing supervisor).

"He was pretty much a one man band; he never asked us anything much."

(Bill Wallace, cataloguer).

"At a fairly late stage, we started having regular meetings with Computer Services staff, and a series of trial runs was established over a year, based on sample databases. But we couldn't do genuine random testing until it was too late to turn back. With most problems that emerged, we were told that nothing could be done about it."

(Neil Jenkins, deputy section head).

"There was a feeling, for some years, that we would never produce a microfiche catalogue; it became almost a standing joke. Staff had little confidence, and wanted to carry on with the manual system."

(Michael Harris, section head).

7.4 Using the Computerised Catalogue:

7.4.1 The Catalogue in Current Use:

The systems development process summarised differed substantially from the failed processes which had preceded the Procurement project at East End Engineering in the 1970s. While they were equally unsuccessful, there had been no attempt at City Libraries - however inflexible - to carry out a process of systems analysis. Furthermore, at City Libraries the resources had not become available, in the mid-1980s, to adopt a more flexible and thorough approach. Both central government constraints over local government funding, and the City Council's restrictive and hardware-centred IT policy, had played a part here.

However, in terms of clerical skills and use of IT, there are some parallels between the two case-studies. Both Tina and Catherine referred to their work as *"just inputting really"* at the beginning of their interviews. But their detailed descriptions referred to a range of skills and activities very similar to those described by Susan and Louise at East End:

- (i) Skills related both to typing and to computer use: for instance, fast, accurate keyboard use and document layout;
- (ii) Social and organisational skills: coordination of a fluctuating flow of work; maintenance of cooperative working relationships with clerical and professional colleagues;
- (iii) Problem-solving skills: responses to queries, both within BS and from other library sections. These concerned both the use of the computerised catalogue, and specific items and processes (book orders in progress, cataloguing details, discrepancies or errors).

Neil Jenkins, BS deputy section head, also described a general 'knowledge of the book trade' as something which all the section staff had acquired, and come to rely on, through ordering and processing library acquisitions.

In general, the staff I interviewed at East End Engineering had found that computerisation contributed to greater efficiency and improved access to information, even where (as in the typing/wordprocessing section) some deskilling and increased stress were also evident (c.f. Wagner, 1985; Liff, 1990). In contrast, interviews at City Libraries revealed intense dissatisfaction with the use as well as the development of the computerised catalogue. This picture is more reminiscent of the failed or only partially used systems described in the surveys cited at the beginning of Part Two (National Audit Office, 1990; Hornby et al, 1991). The specific

difficulties described by staff and management fell into three main areas:

(i) Difficulties arising from the lack of consultation with users (clerical, professional or managerial) during the deveopment process:

A number of major inadequacies in the computerised catalogue made it inferior to its card-based predecessor, and considerably more stressful to use. In fact, BS staff and their reference library colleagues had informally continued to rely on the card-catalogue, even for information which was included on the microfiche. The latter became an additional reference source, rather than the main or only one. Problems included restricted access to the title index on the 'Short Title File' available at terminals to library staff (not to the general public). This could only be used by moving through the alphabet letter by letter. Reaching later letters, therefore, was a tedious and cumbersome process. In addition, the 'matching' process with the British Library tapes had proved far more problematic than expected; BS staff estimated that some 80,000 records had been missed in this way. These could have been manually entered - but funds were not available in City Libraries for the huge data preparation effort this would have required. Access to the card catalogue remained essential for some items of stock, therefore. As a third example, BS staff pointed out that the location entries on catalogue records used letter codes to indicate the area but not the branch

library in which an item was held - preventing fast and easy reference, for borrowers or for staff processing reservation requests.

BS staff felt that had they been consulted, they could have pointed out why and how these practical details should have been addressed. While this would not have resolved the funding difficulties which had given rise to the missing 80,000 records, there is no reason why such a process could not have anticipated and prevented the other two problems.

(ii) Difficulties related to local authority structure and policy:

Here there were three main aspects. Firstly, there were the restrictions associated with the City Council's commitment to buying ICL equipment and software. ICL had never successfully produced library systems, whereas a number of other suppliers had established themselves in this quite specialised area. By the mid-1980s, City Libraries management and staff were increasingly frustrated when Council guidelines and policies prevented them from selecting software and equipment from other sources, which were both more appropriate for library purposes and less expensive than ICL options.

Secondly, City Libraries remained dependent on batch-updating, and computing support in general, from the Council Computer Services department. This was generally associated with delays, substantial errors and periodic

hardware (mainframe) failures. During July 1986, for example, the system in Bibliographical Services was 'down' for the equivalent of almost half of each working week. The Computer Services department tended to prioritise 'front-line', high-profile services such as housing; requests for help or information from City Libraries were often met with slow responses. There was a general feeling, at City Libraries, that computing expertise and facilities were not sufficiently under user or departmental control - as is reflected in the Computer Development Librarian's report, quoted above.

Thirdly, non-professional staff at City Libraries had experienced a lack of training in relation to IT which was somewhat at odds with the stated priorities of the 'alternative grading scheme' and with the other innovative measures summarised in section 7.1.1 above. Formal training had been limited to short 'computer literacy' courses, which many staff found patronising and lacking in applicability to the library context. Informally, some staff had been encouraged to 'play with' new equipment, but this represented the other extreme; with no experienced staff on hand to offer support and information, the apparent informality proved intimidating and confusing.

(iii) More general issues:

Both the typists whom I interviewed described specific health and safety concerns related to VDU use, which were reported by word-processor users at East End Engineering - and which have been documented in a number of studies of

VDU use (see for example London Hazards Centre, 1987). These included recurrent headaches, back problems and eyestrain. As at East End, all BS staff who used VDUs adapted their own routines in order to avoid long periods of terminal use. However, their position was strengthened by their awareness of the new technology agreement which had been negotiated between NALGO and the City Council. This specified a half hour break after two hours' VDU use, and a maximum of four hours' VDU use per day. However, considerable unease remained, in this area. BS staff expected their reliance on computerised systems to increase, and in fact wanted enhancements to the existing facilities - for instance, on-line updating and amending of the Short Title File. In this context, they could not see how the safeguards of the new technology agreement could be retained, without a radical change in job design and work organisation within the section. (This is discussed further in Chapter Nine).

Both the typists and the other staff responsible for book-ordering and cataloguing also expressed two further concerns. Firstly, there was a mistrust of the computerised catalogue which appeared to go beyond its obvious inadequacies, considerable as these were:

"I think people tend to look at a card, and they can believe what they see when it's in front of them. But when it just pops up on a machine, I don't think they tend to believe what it says."

(Tina Bell, typist).

"Take the computerised cost-centring system: the community librarians don't believe it when it says they're overspent."

(Gwyneth Evans, book-ordering clerk).

These comments point to a sense of abstractness, or unease, associated with some loss of control over the processing of information, which becomes partly invisible with computerisation (c.f. Goodman and Perby, 1985; Lie and Rasmussen, 1985). However, comparison with the experience of the clerical workers interviewed at East End Engineering suggests that this may not be an intrinsic feature of computer use, but a reflection of how far systems users are involved in the design process. At East End, Susan Stone and her colleagues were able to base their confident day-to-day use of the computerised system on their own experience of observing, or taking part in, the building of a system from previous manual routines and user requirements.

Secondly, the typists in BS, in particular, had experienced both increased monotony and some deskilling, once consulting and amending the Short Title File had largely replaced the manual preparation of catalogue cards. This is complex, however. While both typists interviewed anticipated a continuing deterioration in job satisfaction, with increased computer use, they - and their colleagues in BS - also emphasised the continuing importance of the knowledge and skill acquired before

computerisation. Tina Bell, for instance, described the continuing importance of the detailed 'working knowledge' acquired over time, in the ways discussed in Chapter One:

"It is harder now to train people. Before, we'd got a card system, so everything was there in front of you. You'd got your book, and if it was there in the catalogue, it was there. With some things, you think 'well, I've seen it before', and so you investigate further. But I suppose if you've not been here very long, you can't rely on what you've seen before."

(Tina Bell, typing supervisor).

Carol Finch, an experienced cataloguer, referred to the ways in which some aspects of skill and working knowledge become tacit or taken for granted through daily use:

"Long experience means that you forget how and what to explain, when you're training someone new, because you're just doing the job automatically."

Bearing in mind the distinctions made by Ehn (1988) and by Janik (1986), this comment appears to refer to skills and to knowledge which have become 'non-explicit' through daily use, rather than being essentially tacit (and thus observable only through example). (Ehn, op. cit., chapter 18). Such 'non-explicit' knowledge could in theory be rendered explicit, for example in response to detailed questions from a systems analyst (or a new BS staff member). However, active systems design techniques - such as mock-ups, role-plays and prototypes - would remain

essential, in order to encompass those areas of skill and knowledge which are tacit in a more fundamental sense.

Michael Harris, head of the section, commented wryly:

"It's getting to the stage where people say 'ah yes, it's big, and it's blue, and I think I classified it at so and so a couple of months ago'. It's ironical - when we're dealing with computers, it's a topsy turvy way of going about it."

Or is it? This comment certainly illustrates the frustrations created by a cumbersome and inadequate information system. But it can also alert us to the alternative perspective proposed by Human-Centred systems designers such as Rosenbrock (1989), Cooley (1987) or Gill (1990). In this perspective, the more informal and tacit aspects of working processes and relationships are not expected to be straightforwardly accessible to systems analysis techniques; instead, the aim is for designers and users to collaborate in trying to embody them in mock-ups, prototypes or examples of working practices. Information technology is not expected to remove all complexity, but to complement human flexibility and skill.

Only one of the BS staff whom I interviewed had any contact with computers outside work. This was Brian Wallace, who was about to return to cataloguing duties after a long period spent checking printouts of catalogue entries for errors. In his mid-fifties, he had transferred to BS after experiencing stress-related

illnesses while in professional branch library work. Outside work, he was involved in running a small computer club; this appeared to enable him to act as something of an informal expert within BS. He was also the only one to comment on the advantages which a computerised catalogue could offer, if some of the design problems could be resolved. As a middle-aged man in a section (and a department) whose lower and middle reaches were overwhelmingly populated by women, he was a very visible exception. In contrast, his computing activities outside work were shared entirely with other men; he did not condone this, but nor did he find it remarkable:

"No, there aren't any women. They'd come in, they'd see the fifty men in there drinking beer, and they'd think they'd walked into the wrong club."

Here, then, Brian provided a small illustration of the 'male tenure' of technology outside paid employment which has been comprehensively documented by Cockburn (1985) and by others (see for example Haddon, 1988). In his own case, this formed part of an informal and largely unacknowledged pattern within City Libraries itself, in which male professionals tended to take the initiative in exploring information technology options - although women non-professionals remained the most intensive IT users on a day-to-day basis.

7.4.2 Broader Issues and the Future:

All those interviewed at City Libraries were in general

agreement, regarding the inadequacies of present computerised systems, and the need for a different approach to the planning of new systems. In many ways, the history of difficult relations with the Computer Services Division served to focus everyone's discontent, limiting their view of any future libraries system to the determination that it should be a stand-alone one, under City Libraries' control.

But beyond this, the picture becomes less clear. Among many staff, whether professional or non-professional, the frustrations and inadequacies of the current computerised systems had contributed to an atmosphere of demoralisation, in which it was difficult to visualise alternative forms of computerisation. At management level, there was no common, shared vision of future systems or strategies, to inspire or at least encourage the completion of a new draft systems specification. The Libraries Director, Pam Chivers, chose to distance herself from any debate about the technical details of specific systems or suppliers, in order to prevent these from obsuring her broader views and policies on the library service. Stating her commitment to making any new computerised system serve Libraries needs, rather than shaping or undermining them, she chose to make a virtue out of her unfamiliarity with technical detail:

"If we can't find a good enough system, we won't have one."

In contrast, however, male senior managers - and the Computer Development Librarian - relished technical discussions, and informal contacts with systems suppliers' representatives. For Dick Sinclair, one of the assistant directors responsible for drafting part of the proposed new specification, an on-line, integrated library system represented opportunities for radical change, in the direction of the 'self-service library', in which many library users would become independent of staff support:

"At the present, we're treading through paper treacle administratively, because we do not have an on-line system. A batch system generating paper ties up vast amount of staff time... So I really want a paperless system. I also want a system which enables users to manage some of their inputs... So for example, if somebody wants to reserve a book, they could just use that public access terminal... The intention is, to release the staff to do what they're actually paid to do, which is to work with users. There is in nothing I'm proposing any intention to get rid of staff, on that saving. The philosophy I'm trying to build into it is that we release staff resources to do a lot of the other things that we simply don't have the space to do at the present time. What I think that implies is that we will reduce the number of base clerical posts - and we have an increasing number of staff with specialisations - and end up with a far more responsive system."

Clearly, this position could be interpreted either as

creating opportunities to further upgrade the career development opportunities of clerical-grade staff - or as promoting a reduction in their numbers in favour of professional appointments. In fact, budget considerations made any expansion in professional numbers unlikely. But Dick Sinclair's colleagues on the departmental management team expressed caution rather than optimism, in connection with his vision of a 'paperless system', pending the opportunity to assess new library information systems in situ.

Such different views, clearly, could form the basis of productive discussion, leading eventually to new plans and policies. But the forum in which this might have taken place - the 'IT Policy Development Group' - appeared too cumbersome, and too ill-resourced, to make this possible.

Finally, in terms of equal opportunities, somewhat contradictory trends were evident. In areas such as training and recruitment, there was evidence of practical improvements for women staff in City Libraries, supported by clear policies. But links had not been made between these initiatives, and those concerning IT. Computing, as an area of interest and competence, appeared to continue to attract men rather than women: whether at the level of personal projects, such as the creation of small databases on personal computers, or at the level of career opportunities, such as the Computer Development Officer post. This pattern, not integrated into evolving policies and discussions on equal opportunities, left open the

likelihood that men would continue to predominate informally in the increasingly important area of IT within library work.

7.5 Discussion:

7.5.1. The Systems Development Process:

In City Libraries, difficulties faced by management in securing adequate resources meant that the development of computerised systems extended over some ten years. In fact, the different components of the planned systems were never completed satisfactorily. Meanwhile, a shift was occurring, in terms of the available options: away from off-line, batch-supported systems and towards on-line, integrated systems. By the mid-1980s, the acquisition of such a system was perceived, by senior management and by computing staff at City Libraries, as an urgent priority.

In contrast with East End Engineering, City Libraries provides an example of substantial agreement between management, computing staff, professional librarians and women library assistants on clerical grades: all described the systems design approach previously adopted as disastrous. An ad hoc process of development, without reference to any detailed specification or analysis and design methodology, had effectively left all decisions in the hands of a small group of people whose allegiances were to the Computer Services division, not the Libraries. The details of the systems development (or adaptation) process, as it took place, were not visible to City

Libraries staff, who felt unable to exercise any influence. While a certain amount of testing had taken place eventually, in cooperation with a small number of cataloguing staff, this occurred too late to prevent serious inadequacies being built into the computerised catalogue.

Some of the frustrations experienced by Libraries staff arose from the fact that they were continuing to work with a batch-supported system, while the wider availability of on-line systems had caused public expectations to rise. But others were directly related to the development process: the lack of a proper title file on the catalogue, for instance, or the use of obscure codes rather than branch-related letters to refer to the location of items.

At City Libraries, then, the significance of user-involvement became most evident through its absence. (c.f. Hirschheim, 1985). Lacking detailed knowledge of procedures in Bibliographical Services, those who constructed the computerised catalogue neglected key features, such as ease of access to a title index. Their over-optimism about computer-based procedures for data capture resulted in a catalogue which was demonstrably harder to use, and less comprehensive, than its manual predecessor. Owing to their effective exclusion from the development process, staff in Bibliographical Services were unable to assess how easy or difficult it would have been to pre-empt these problems, or to put them right. They were left with an enduring sense of frustration,

compounded by a profound unease about the prospect of further phases of computerisation. Women staff on junior grades felt particularly vulnerable, in this context.

From a gender perspective, City Libraries is clearly an example of an organisation with a degree of commitment to establishing equal opportunities. However, no links had been made between discussions and policy initiatives on equal opportunities, and questions of information technology design, training and use. In fact, some tension was evident, between formal equal opportunities policies, and patterns of informal inequality; these patterns were associated both with the increased importance of graduate entry to professional posts, and with the preponderance of men in IT-related posts and projects. At the level of recruitment, the possibility remained that the informal patterns of gender inequality associated with an increasingly stratified entry to library work in general, and patterns of gender inequality within IT-related work in particular, could prove mutually reinforcing.

In connection with information systems development, City Libraries' policies on clerical-grade career development did offer the potential to create opportunities for women library assistants' active involvement in future systems development processes. However, in order to initiate such involvement, one crucial step would be the recognition, and renegotiation, of taken-for-granted boundaries

defining the scope both of 'equal opportunities' issues and of 'IT' activities. Women library assistants' apparently limited experience of IT - as 'novices' on computer literacy courses, or as intensive 'routine' users - would have to be examined and reassessed.

City Libraries did in fact offer scope for research along these lines, largely because of determination at all levels in the organisation to avoid the mistakes of the past in connection with IT. In Chapter 9, therefore, I discuss the period of collaborative research between City Libraries and the Human-Centred Office Systems project which was initiated in the autumn of 1986.

7.5.2. The clerical labour process:

As in the two previous case-study examples, the picture of changes in the clerical labour process, at City Libraries, is complex.

Firstly, the development of computerised systems in BS, partial and inadequate as it was, cannot be said to have brought about clerical deskilling. The system was neither comprehensive enough, nor reliable enough, to replace former manual routines; and even where these were no longer in full use, staff referred to them in order to retain an overall understanding of book ordering and cataloguing procedures. This was a period of considerable uncertainty, therefore: 'new' systems were not securely enough in place to support thorough training, for example, and yet 'old' manual routines were already being partly

replaced. Although some clerical skills were no longer exercised - for example, layout of record cards - others had become more important than before computerisation: fast and accurate keyboard use; skills in searching for, organising and communicating information; informal 'working knowledge' of cataloguing details and processes. (Kusterer, 1978; Lie and Rasmussen, 1985).

At the same time, it was becoming clear that increasing use of IT was placing pressure on the formal safeguards offered by the new technology agreement negotiated between management and trade unions. Staff wanted on-line access to the computerised catalogue, for example, in order to cut out tedious and cumbersome manual and data preparation operations. However, they were also aware that without more fundamental changes in job design, these kinds of developments would make it impossible to keep daily VDU use within the agreed four hour limit.

Secondly, the systems development process could not really be considered to have been successful, in the sense that new computerised facilities did not represent sustained improvements over pre-existing manual procedures. Existing computerised systems had given rise to a great sense of frustration among Libraries staff, related to a perceived loss of control and of job satisfaction. However, this was not the result of any shift of control or discretion towards supervisors, professionals or managers, who in fact shared the frustration expressed by women clerical staff. At a specific level, all those who

used the computerised catalogue were straightforwardly frustrated by its visible shortcomings. But alongside these well-defined dissatisfactions, staff also expressed a broader unease, related to the ways in which aspects of their work now seemed abstract or intangible (c.f. Goodman and Perby, 1985; Suchman and Jordan, 1989). I have suggested above that this could be attributed in part to the fact that BS staff had been excluded from taking part in, or observing, the ways in which the information system was constructed from previous processes and requirements. Further case-study research would be required to confirm this suggestion, although research in Scandinavian countries has reached similar conclusions.

Thirdly, in some organisations, computing staff have appeared to retain status and control, by marginalising user influence (Willcocks and Mason, 1987, and see Chapter Eight). But in the example of City Libraries, we can observe a transition taking place. On the one hand, the effective control exercised formerly by the Council Computer Services Division, through their command of computing knowledge and financial processes, was breaking down. Departmental users were becoming both more knowledgeable and more assertive; at the same time, political and financial constraints on local government had also contributed to the demise of the previous, centralised 'ICL only' policy. For the first time, the issue of 'user relations' was an explicit concern within the Computer Services Division (see Chapter Eight). On

the other hand, however, 'users' were determined to gain more influence and involvement - but very uncertain of how to achieve this. Some opportunities could be identified, in this context, for a redefinition of systems development approaches in a broad enough manner to accommodate both 'user-involvement' at clerical as well as managerial levels, and issues such as training, job design and equal opportunities.

Conclusion:

The systems development process at City Libraries, then, exemplified many of the problems associated both with batch-processing, mainframe-based applications, and with an absence of user-involvement. However, management and staff shared the view that new approaches needed to be developed, which could involve users in planning for the acquisition of an on-line, 'integrated' library system.

In addition, women clerical workers' experience of information technology at City Libraries appeared to offer a number of openings for the development of Human-Centred Systems initiatives. Even within Bibliographical Services - not a public service section - 'clerical' posts continued to include a range of skills and activities. At an organisational level, the existence of formal policy commitments - such as the clerical workers' 'alternative grading scheme' - represented some opportunities to create links between clerical involvement in systems design and equal opportunities concerns.

CHAPTER EIGHT:

'DRAGGING THE USER IN?'

INFORMATION SYSTEMS DEVELOPMENT IN 'CITY PERSONNEL'.

INTRODUCTION

This chapter concerns the development of a computerised personnel information system, within the local authority already described in Chapter Seven, 'Northfield City Council'. Here, however, we move from a Libraries context to two departments responsible for providing a range of central services to the local authority as a whole: 'City Personnel' - the central personnel department - and 'Computer Services', a division within the City Treasury. Within the broad framework of the local authority, both operated as organisations in their own right, with distinctive practices and policies, both in relation to IT and at a general level.

The systems development process described below was carried out between 1986 and 1989 (although it was not fully completed at that stage). The overall aim was to develop and implement a system to support most aspects of personnel work in the local authority, by building on and adapting a substantial software package purchased from ICL. This was 'Personnel 29', a package with facilities to computerise personnel records in twenty nine basic areas. In this respect, the personnel project is representative both of the ICL-based purchasing policies which prevailed in Northfield Council during the 1980s, and of the

current, general trend, in the office context, towards buying in software for adaptation and implementation, rather than developing it entirely 'in-house'.

In contrast with the informal character of the information systems development approaches described in Chapter Six and Chapter Seven, the methodology adopted for the personnel project was a formal, structured one, of the kind discussed in detail in Chapter Two (LBMS, 1986).

The account which follows is based both on observation of meetings and other systems development activities, between May 1986 and October 1988, and on detailed interviews with members of the personnel project team at key stages of the development process. (The scope, timing and organisation of the interviews are described fully in Chapter Five).

In section 6.1 below, I discuss the organisational context for the personnel project, and then describe the project itself in section 6.2. In section 6.3, I provide an account of the systems development process, and then discuss some of the issues it raises in section 6.4.

6.1: The Organisational Context of the Personnel Project:

Central Personnel:

At the time of the case-study, each of the sixteen departments in this local authority had its own Personnel section: these ranged from one Personnel Officer with clerical support, in a small department such as Libraries, to a network of sections staffed by dozens of people, in

large departments such as Housing or Education. Situated in the Town Hall, the Central Personnel department provided liaison and coordination, as well as providing resources for recruitment, training and other areas. But because Central Personnel staff carried out little of the day-to-day personnel work within the authority, the department was sometimes perceived as a source of unwelcome interference, or an unnecessary overhead, by Personnel staff in individual Council departments. Central Personnel staff, in turn, tended to refer to other departments as being 'out in the sticks': out of touch with new ideas and developments.

Just over 150 people were employed in Central Personnel, of whom 78 were women. Reflecting the overall patterns described in Chapter Seven, 47% of women in the department were on senior grades (SO1 and above), while 75% of their male colleagues occupied these grades. (Figures from an internal report produced for the Council Women's Unit).

During the case-study period, plans were drawn up for the gradual decentralisation of City Personnel staff and functions. Although these plans coincided with the personnel systems development process, and began to be implemented in 1989, no explicit links were made between the two by management in City Personnel or in Computer Services.

The Computer Services Division:

Situated in the Treasury, the Computer Services division employed analyst-programmers, technicians and data preparation staff, to supply and maintain systems ranging from microcomputers to large applications on the Council mainframe. As outlined in Chapter Seven, senior staff in the division had exercised considerable influence, in the past, over discussions and decisions within the Council Information Technology Panel, by virtue of their perceived technical expertise. In many cases, tensions had developed between Computer Services staff and 'users' in specific council departments, who experienced the former as unforthcoming and over-keen to promote their own solutions, rather than engaging in discussion. At the same time, the department was not well-resourced, in comparison with similar departments in many parts of the private sector; pay levels were markedly lower, and this had contributed to a high turnover, and to chronic understaffing.

But with the erosion of the former 'ICL-only' purchasing policy, and the increasing development of computing experience and interest among professional and managerial staff within the authority, this influence had decreased. At the same time, the prospect of government legislation to introduce compulsory competitive tendering (in 1989) placed new pressures on Computer Services staff to foster good relationships with their user departments, in order to retain as much work, and therefore staff, within the

division, as possible. To this end, plans were drawn up in 1988 to partially decentralise the department, attaching teams of staff permanently to different Council departments, in order to improve contacts and communications.

Patterns of gender divisions in employment within the Treasury as a whole again reflected the general patterns noted in terms of the authority, and in terms of the Central Personnel department. Separate figures were not available for Computer Services; broadly speaking, there were a small number of women in senior positions, and working as programmers, although the largest number of women worked in data preparation. As in other sectors of IT employment, there was a move in Computer Services towards creating integrated 'analyst-programmer' posts (Friedman and Cornford, 1989). This could benefit women, by reducing the possibility of their being 'ghettoised' in low-status programmer posts. While pay for computing staff in the local authority has not compared favourably with the private sector, some features of employment conditions - including for instance flexi-time, part-time and job-sharing opportunities - do appear to have facilitated the recruitment of women. Jill Evans, the woman analyst-programmer interviewed in the course of the case-study, had previously been employed by 'F International', a private company which has explicitly set out to employ women on part-time and flexible bases. Despite relatively

low numbers, her feeling was that "women are well-represented here." This is in marked contrast with the image of Computer Services staff put across informally, in City Personnel and in other departments, where they were routinely referred to as "*the lads from downstairs*".

Political and economic constraints, imposed since the early 1980s through central government 'capping' of the rates income levied by the council, created a climate of uncertainty and some demoralisation among staff and councillors. This was then reinforced by the introduction of legislation which enforced the putting out of various council services to competitive tender, in phases, starting in 1989. In this climate, computerisation came to be perceived by some departmental managers as an increasingly important contribution to sustaining service provision within tight budget limits. The development of a Computerised Personnel Information System, between 1986 and 1989, was seen by Central Personnel management (and Councillors) as an important contribution to improved corporate planning, in this context.

6.2: The 'Computerised Personnel Information System' (CPIS):

Aims and Starting-Points:

The original aim of the CPIS project, then - as set out in a consultative document drawn up in Central Personnel, in 1986 - was to provide improved management information, on

a corporate basis. The twenty nine personnel functions to be included in the system ranged from the maintenance of basic employee records, to the provision of information to support complex policy initiatives: for instance, equal opportunities monitoring, and a plan to improve the position of low-paid Council employees. The computerisation process could, therefore, be expected to affect the content and organisation of a range of clerical, administrative and professional posts and procedures, both in Central Personnel itself, and in each of the other Council departments.

Achieving this aim of improved corporate management information also required the collaboration of every Council department, in providing information about current practices, and outlining information requirements or problems. Since manual personnel record-keeping, and other personnel procedures, had evolved separately in each department, CPIS was a large and complex project. Implicitly, the project also represented the possibility of a standardisation of procedures, led either by Central Personnel or by Computer Services.

When the case-study began, in May 1986, preliminary consultations had been concluded, between Central Personnel management and the five trade unions representing Council staff. The only concern expressed on the union side concerned a request for reassurances that adequate security measures would be taken, to safeguard personal information which would be held on the proposed

system. Two available systems had been reviewed by Computer Services staff; on their recommendation a contract had been signed with ICL, for the purchase of their package 'Personnel 29'. This provided a basic structure and set of facilities, which could be extensively adapted to local needs.

At this stage, Central Personnel and Computer Services staff expected to have a pilot version of the system available by autumn 1987. In the event, this was not ready until September 1988, when it was still far from complete. The account that follows, therefore, is limited to the design and discussion processes which contributed to producing the pilot system: it was not possible to see the system in sustained use, in any form.

6.3: The Systems Development Process.

6.3.1. The Context and the Systems Development Methodology:

In common with other large office systems applications within the City Council, the computerisation of personnel information had been under discussion since the 1970s - giving rise to considerable scepticism among staff:

"Discussion began in 1975, with a proposed implementation date in 1980. It became a bit of an old potato. People felt it would never happen."

(Paul Yates, Central Personnel).

In 1985, management in Central Personnel took steps to

remedy this situation, by appointing Paul Yates to a senior post, with specific responsibility for seeing through the CPIS project. He in turn secured the secondment of two more junior professional personnel staff. These three 'user' representatives combined with five Computer Services staff, to form a project team to plan and implement the system. The three Personnel team members, along with three analyst-programmers from Computer Services, were committed to the project full-time for a year, from September 1986 (and in fact they remained substantially involved for another year after that). A Steering Committee was also established, with senior management representation, to oversee the process.

On the advice of ICL, a 'structured' systems analysis and design methodology was adopted - 'LSDM' - of the kind discussed in detail in Chapter Three. This emphasises project control and detailed documentation, through the use of a *"simple, logical framework... taught to the developer as a prescriptive set of tools and techniques... although LSDM is not a magic recipe, it is, to a large extent, a 'cookbook' approach."* (LBMS, 1986, p.8).

A key feature of the approach is its 'life-cycle' sequence: current practices are recorded first, through data flow diagrams (DFDs) and other techniques; problems and requirements are recorded; a 'logical' design is drawn up, and only at the end are physical and technical constraints and options dealt with. The method also claims to require and to facilitate 'user-involvement', partly by providing a communications base between users

and systems designers.

In fact, this methodology was new to the Computer Services staff involved in the project, as well as to those from Personnel. Only the two most senior Computer Services staff, whose involvement in the project was of a part-time and project-managing nature rather than a day-to-day nature, had attended a short, formal training course in LSDM:

" We're entering new ground. LSDM is pulling together ideas, some old and some new, into one approach; it's as good as any. But we're going to need some basic training in the methodology. We're sadly lacking in the systems analysis and design area anyway; apart from me and Tony, the other lads haven't much experience."

(Don James, team leader in Computer Services).

In 1986, a week's introductory training course in the use of LSDM cost approximately £900. No funding was available to send more Computer Services staff on such courses; as an alternative, Don booked a series of training videos on structured approaches to systems analysis and design from ASI, an American company. Four working party members viewed these during July and August: the three analyst programmers from Computer Services, along with Paul Yates from Personnel.

For Don James, LSDM represented a way of making a very large and complex project more manageable, given the lack of experience and resources in his department. For Paul

Yates, on the 'user' side, the emphasis was different. His main concerns were to ensure that the CPIS project made visible progress without further delays, and that personnel staff in general should be won over to the idea of using the eventual system. He viewed the prospect of user-involvement as *"an excellent opportunity for a PR exercise."* During early discussions with Don, he did have difficulty adhering to the separation LSDM requires between the mapping out of current procedures, and the consideration of new requirements and implementation issues; listening patiently to Don's explanations about the methodology, he would periodically comment *"Yes - but when do we talk about what we'll need with the new system?"* But he concluded:

"To me as the user, it doesn't matter what approach we take, so long as we get the end-result. I've got sufficient faith in Computer Services to leave it to them to say what approach they'll use."

At this stage, the term 'user' generally referred to the three Personnel members on the team itself:

"We'll have the user - yourself (Paul Yates) or other guys - sat with us, instead of us going out and seeing people. The biggest chunk of work will be systems analysis and design; we've got to get it right."

(Don James, Computer Services).

But on occasion, the term was used to refer to personnel staff in general, in Council departments, and then the

expectations implied were much more restricted:

"We're not exactly going to ask the users, are we, it's more saying to them 'this is what's going to happen.' All right, it might be a bit two-way..."

(Don James, Computer Services).

References to 'users', then, reflected the ambiguities discussed in Chapter Three. In terms of contact with Personnel staff in general, the emphasis was largely on the 'public relations' aspects of the systems development process, with an eye to 'avoiding dysfunctional resistance', in the way discussed for instance by Hirschheim (1985). The three Personnel working party members, on the other hand, were to be both intermediaries and crucial sources of information. Both forms of user-involvement were expected to be a priority in the early stages of systems analysis, and then to tail off, while Computer Services staff took on the substantial 'technical' work:

"I think we'll work more on our own on the design stage... then they'll come back at implementation."

(Jill Evans, Computer Services).

6.3.2: Using a 'Structured' Methodology:

Issues, Outcomes and Problems:

Detailed work began in September 1986. Team members worked in user/analyst pairs, visiting every Council department, and recording details of Personnel procedures on data flow

diagrams. At this stage, the plan was to submit a detailed data model to ICL the following spring, in order to have the pilot version of the system available in autumn 1987.

In the event, analysis of the information gathered took until Spring 1988, not Spring 1987. By the time a limited pilot system was available for demonstration purposes, in September 1988, other events within the Council had begun to overtake the CPIS project. Most crucially, changed budgeting procedures meant that individual departments were to be charged separately for central services, including computing; those wishing to implement CPIS would have to pay for it, rather than installing it as part of corporate provision. In the context of tight budget limits, already posing a threat to the maintenance of existing levels of service to the public, feedback from departments to Central Personnel indicated that CPIS would not be a top priority. This cast major doubts over the likelihood of a genuinely corporate system ever taking shape - and thus over whether the central aim of the project could ever be met.

At a general level, then, the personnel systems development process was considerably less straightforward or successful than the Procurement project at East End Engineering, described in Chapter Six. Specific local circumstances, and aspects of the structured systems design methodology, all played a part in this outcome.

(i) Local Circumstances:

Local circumstances were certainly difficult. The absence of any proper training was seen as a major problem by all team members:

"There was no training at all - you found it out for yourself - it's something we (the Council) are very poor at."

(Q: What kind of training would have been useful?)

"(Pause)... programming - understanding the computer and what it could do, its various functions... But there was nothing at all, just trial and error. I don't know its full capacity, I was never taught. It's a real waste. We seem to have all the equipment, but no knowledge to work it."

(Sally Atkins, Personnel).

The videos used at the outset had been no substitute for real training. Halfway through the project, Don James organised a week's course on structured methodologies, with local Polytechnic staff. One of the analyst programmers commented:

"After the Poly course, we realised how little we did know. For instance, the difference between physical and logical DFDs, and which processes we were interested in.. We'd got lots of processes on our DFDs which should never have been there at all, even on the physical DFDs. It was different on the ASI videos, they never gave specific

instructions for which processes to include. They said the DFDs were to help the user understand what's happening, and that's how we used them. Whereas LSDM is more inclined towards implementing a computer system, rather than help the user understand what you're doing."

(Jill Evans, Computer Services).

This lack of resources for training reflected the wider spending constraints being experienced by local government in general, but it also appeared to illustrate a fundamental lack of senior management support for, or awareness about, the whole personnel project and its wider implications:

"Whenever a meeting was called for a decision outside Paul's authority, nobody turned up, it was a waste of time; I think the Steering Group met once. So Paul's had no support from beginning to end, it's been a complete farce. I think both the Chief Officer (Personnel Director) and our boss aren't really enthusiastic about the system, because they don't really know what it'll do, and have never shown any interest in finding out."

(Sally, Personnel).

These comments, then, point to a range of difficulties: resources for providing training and other support for the systems development process were lacking - and senior management interest in the project was uneven at best. In this context, adherents of the prescriptive, 'step-by-step' approach laid down by LSDM might be expected to

consider their methodology a highly appropriate choice - a 'cookbook' approach to enable relatively inexperienced users and analyst-programmers to get to grips with a complex project. The following section illustrates the strengths and weaknesses of the methodology which became apparent in practice.

(ii) Using a Structured Systems Analysis and Design Methodology:

A Good Communications Base:

In some respects, the adoption of a methodology new to all team members helped the 'user' members: everyone was learning the jargon and the procedures at the same time. Early in the development process, when team members were visiting departments in pairs, almost all were positive about the use of DFDs. They had provided a useful, common communications base:

"I think the method has definitely helped us work closer together. They (Personnel) can see more about how the system is developing, and understand it; and they've been a big help to us, they've saved a lot of investigation...It's been very good, working with them, actually, rather than us going out and interviewing people on our own. When we went out in pairs to departments, I wouldn't know what they were talking about, but the Personnel person would, and between us we seemed to pick up most things."

(Q: Did people in departments have information written down, or was it in their heads?)

"It's in their heads! And they all fill different forms in anyway..." (Laughs).

(Jill Evans, Computer Services).

Sally, in Personnel, also confirmed that the DFDs had been useful in bringing out those aspects of Personnel procedures which had become part of the tacit working knowledge of the staff in departments:

"If some people didn't know where to start, they would have been very brief, and assumed you knew a lot. So you had to bring in the DFD as well, to bring in the various facets of the process, and hope this would prompt something they maybe wouldn't have said."

However, effective use of DFDs, in this way, depended a great deal on the skill and sensitivity of CPIS team members. Sally commented on the difference between working with hand-drawn diagrams, and working with some produced on screen, using 'Automate', an 'analyst workbench' package designed to speed up the drafting process:

"There was a definite preference for the hand-drawn diagrams, as compared to those drawn on word-processor, because people couldn't cope with those, they were so concentrated, not 'human' at all. I think if we'd presented all word-processed ones to users, they wouldn't have helped as they did; they would have been frightened away."

The one dissenting voice came from Geoff Rogers, the most

experienced analyst working on the project. He felt that the overall aims of the project were inadequately defined, and that the use of LSDM made his work harder rather than easier:

"This is the first time I haven't really known what the user wanted. Even at this stage, I still don't know; I've only found out what they do at the moment. I think we've tackled the job altogether wrong. Usually, you go to the user, and you have to try and interpret what they actually want, compared to what they say they want... That's where intuition comes into it. That, and experience in dealing with similar jobs and applications. You can come up with information he wants to get out, but is not capable of telling you directly."

Initial expectations, among all team members, had been that the three Personnel members' involvement would tail off after the preliminary, information-gathering phase, and become important again at implementation. But instead, their experience of the initial stages of systems analysis, visiting council departments alongside Computer Services staff, caused their interest and involvement to grow more substantial.

From the Computer Services side, Don James commented:

"A few months ago, I would have said that the next stage will definitely be more computer-oriented. But I've had second views. I see some recourse to Personnel all the way through this exercise, even if it's not at this level of detail, that's hard to assess. And I think they

will understand a lot more why we're doing things. We're going to need their input, to be honest."

Clerical staff were not represented directly on the CPIS team; nor were they formally identified as key contacts. Normal procedure was for team members to approach the Personnel Officer in charge of a departmental personnel section first. However, basic-grade clerical and administrative staff usually did prove to be the main source of detailed information:

"The problem is, you want to talk to the man who does the job, but you've got to let the manager know; you tend to talk to the manager first, but they haven't a clue what happens at ground level... people wanted to stamp their authority..."

(Geoff Rogers, Computer Services).

Very often, 'the man who does the job' was a woman, on a clerical grade:

"On everyday things... they were the ones who gave us most of the information, actually. (Laughs). They could tell us exactly what happens, which forms are completed and so on."

(Jill Evans, Computer Services).

Moving From Analysis to Design: Issues and Difficulties:

From April 1987, team members began to go through the detailed information they had collected, on departmental visits, and to try to design the database and the screens

which would make up the new system. Here, they began to experience serious difficulties, in two areas.

Firstly, they found that neither they, nor prospective systems users elsewhere, could reach final decisions about design features, until they had practical examples to look at; but the formalised 'life-cycle' approach of LSDM made no allowance for this. Towards the end of the main phase of design work, one analyst programmer explained:

"I would suggest we could have cut the DFDs investigation down by nine to twelve months, and then developed and concentrated on screens and paths, because it's only at that stage that the user can see the thing, not on paper, but in use, and that he can say 'can you put this in', and so on."

(Jim Sinclair, Computer Services).

Bearing out both the critiques of structured methodologies reviewed in Chapter Three, and the experience described at East End Engineering in Chapter Six, one of the analyst-programmers on the team concluded that a prototyping approach would have been more effective.

The second set of difficulties encountered by the team was to do with the ICL package itself. In the early stages, ICL consultants had advised the team not to feel constrained by the structure of the package, but to conduct their analysis independently of it, leaving details of technical and physical constraints to the end of the process, in the way prescribed by LSDM. In the

event, this became a major source of frustration, for the three analyst programmers in the team:

"We'd come up with what we thought was the best solution, only to find that 'Personnel 29' couldn't cope with it, and we had to do it a different way."

(Jill Evans, Computer Services).

Jill added that in fact the ICL package included screen-generating software which could have lent itself very well to the prototyping emphasis favoured by Jim:

"This package brought the screens up very quickly. I think if we'd known a bit more about what the package could do, we might have approached it differently."

Geoff provided further illustrations of the difficulties presented by applying LSDM to a development based on an existing software package:

"We've been producing masses of output, which was never looked at again - and that's not good for motivation. At the end of the day, they (ICL) came in with a rigid database model, on which we had to map our entity models. It took longer than ICL expected, largely, I suppose, from our resolve not to give in to what it couldn't do."

As a specific example, Geoff explained that 'Personnel 29' made no provision for calculating sick leave and related payments. Personnel members in the team had insisted on

including these processes; this had meant both resorting to software adaptations of a kind which Geoff compared to 'chewing gum and string' devices, and also making new links between processes in Personnel sections and those in Wages sections. This in turn was hard to achieve, because no corporate forum existed in which to discuss and decide on related changes in working practices in the Wages sections and in Personnel sections. These practices also varied enormously between departments, and included many informal or tacit aspects, passed on to new staff over the years by experienced colleagues. Geoff's concern was with how easy the computerised system would prove to understand, to use and to maintain; he was not convinced by the Personnel team members' view that adding on extra features would help 'sell' the system to users.

Not surprisingly, the overall effect of these difficulties was to demoralise the analyst programmers working on the project.

6.3.3 The Experience of 'User-involvement' During the CPIS Development Process:

In contrast with their colleagues from Computer Services, the Personnel team members' confidence grew as the CPIS project went on, despite the difficulties. They remained centrally involved, despite the initial expectations that their contribution would tail off after the preliminary analysis. They took the lead in specifying which manual processes should be computerised, and in what form. They also recognised both the analyst-programmers' dependence

on their detailed knowledge, and a degree of hostility or ambivalence:

"There was some jealousy, some reluctance to involve the end-user. From a Personnel viewpoint, we could see some hostility that we were involved at all. But without the knowledge and awareness of the current system, it would have taken longer, and been less flexible."

(Alan, Personnel).

When some of this ambivalence came to be expressed in unilateral alterations, made by one analyst programmer, to some features of screen design, the Personnel team members instituted a formal 'change control procedure'. Through this, all such alterations had to be agreed and recorded in writing.

While the DFDs in particular had proved very useful to the Personnel staff in the early stages, their later involvement appeared to depend on factors and techniques not addressed by structured methodologies. The 'change control procedure' was one; at a more general level, they also arrived - without explicit discussion - at an informal division of labour. Sally concentrated on documentation - something evaded by some of the Computer Services staff, who found it tedious. She also emphasised the importance of her 'dejargonising' role, in team and inter-departmental discussions, including vis a vis her colleague Paul:

"The thing I constantly seemed to be doing was

dejargonising. Paul's been involved so long, he's picked up the technical language, and occasionally you have to stop him and say 'What does that mean?' Paul got quite upset, he didn't realise he'd adopted so much jargon himself."

However, Sally also saw Paul's grasp of technical detail as crucial, in safeguarding 'user' influence within the CPIS team:

"It's been really necessary for Paul to have computer skills as well, because he gets to know when they're saying 'you can't...' just for the sake of saving work. He's started to know his way around the system, and he can offer suggestions himself for alternative methods of doing something, which is really constructive."

Reactions to this degree of user-involvement on the part of Computer Services staff varied, revealing different perceptions of the definition of technical and non-technical work, and of the appropriate relationship and balance between the two. One analyst-programmer welcomed Paul Yates' detailed knowledge and involvement, confirming Sally Atkins' view:

"Paul (in Personnel) understands more about the data model diagrams than I do... he's quite a technical user now. On 'how does Querymaster* work?' he gets a bit befuddled, but that's the coded technical side. On design, on how things fit together, it's much better. He can say 'I want so and so done, and it would be best like this,

and we can trust him."

(Tony, Computer Services).

But in contrast, another - Jill Evans - felt her own skills were in danger of becoming devalued, with in-depth user-involvement:

"We don't need more involvement than in the past... Users have got to be quite technical to be very involved, and not many users are. We've been doing this job a long time; you can't expect the user to come along and suddenly take part in practically everything you do."

As indicated above, these mixed perceptions and reactions did not prevent sustained involvement on the part of the three Personnel staff in the CPIS team. But users outside the team - whether at clerical, administrative or professional levels - had very little influence over events. The substantial delays, attributed by Jim to an inappropriate decision to use the structured design approach, effectively left no time for the detailed discussions with departmental users, which had originally been planned by the team. While Jill had explained that clerical workers were usually the main source of detailed information about Personnel procedures, they were not represented on the team. At an informal level, clerical workers did express their concerns and their priorities regarding the proposed new system, during the preliminary departmental visits on which the systems analysis process was based. These included, for instance, a concern to see how computerisation might facilitate onerous routinee

tasks, such as the collection of statistics for government departments. But neither of these aspects of clerical contact with the systems development process received the kind of formal recognition which would be essential in order to bring about improved clerical opportunities in relation to computerisation, at any consistent level.

6.3.4. Gender Issues Within the CPIS Systems Development Process:

In fact, the CPIS team reflected existing hierarchies and gender divisions within the Council, both in structure and in the way that it worked. There were two women members, out of a total of eight: one from Personnel and one from Computer Services, and both in relatively junior positions. When departments were visited, normal practice was to approach the Personnel Officer first; on occasion, this became frustrating for team members, who wanted to talk to what Geoff referred to as 'the man who does the job' (and who, as Jill pointed out, was usually a woman). At an informal level, Computer Services staff were commonly referred to, by male team members, as 'the lads from downstairs'; and to some extent, sexist exchanges at a trivial level, between the men in the team, often appeared to serve the purpose of defusing tension at the end of a difficult meeting. An application for a new analyst programmer post, from a woman - evidently not the normal pattern of events - attracted one such comment:

"We've had a good application for one of the analyst

posts, from a woman. Tony's going to make her an offer over the phone. He might even offer her the job as well."

(Don, Computer Services).

An uneasy kind of male camaraderie prevailed at times, within the CPIS team, of the kind which has commonly been described in connection with computing (see for example Softley, 1985; Game and Pringle, 1984).

The question of gender issues - and of social or organisational issues in general - is complex in this example, however. The team's initial visits to departments did raise a wide range of issues, albeit mediated through the team rather than discussed directly by departmental staff. This had contributed to a major change of emphasis within the project:

"The initial system specification was top-heavy with management information... I think we've all come round to seeing that that's not what we want, that's like a bonus. People (in departments) are concerned with eliminating duplication, with resolving particular problems. The DFD visits have definitely thrown up lots of issues that need to be dealt with, that haven't really been considered yet... I think CPIS will mean that people rethink their manual systems too."

(Alan, Personnel).

The CPIS project, therefore, clearly presented opportunities for a broad discussion, raising issues of job design and work organisation. But there was no scope

- either at corporate level, or within the project team - to accommodate these considerations. Key issues surfaced briefly, in team meetings, only to be pushed aside by the pressure of the detailed 'technical' work prioritised by the structured design methodology. A major example was the question of how to organise and resource the massive amount of data entry required in order to establish a satisfactory database. This had substantial cost implications, which were not addressed; in addition, there was the implicit likelihood of a large increase in routine, VDU-based work, for the clerical workers who would have to enter the data, with all the attendant job design and health and safety problems. (See for example London Hazards Centre, 1987). Longer-term job design and career opportunity issues, for Personnel staff, were never on the agenda at all.

6.3.5. Broader Issues and the Future:

By the time the pilot version of CPIS was ready, team members were expressing a range of broad concerns, related to the nature of computer systems development, with implications for which methods could be seen as appropriate in particular organisational contexts. Some team members came to feel that the structured systems development approach itself had contributed significantly to the failure to consider the political and organisational changes which eventually came to undermine the project's overall success.

In terms of general comments on systems design and on methodology issues, Geoff's consistent concern was with the scope for discretion available to analysts:

"To me, the method is too regimented. I've always thought that computing's not an exact science, and to me the methodology is trying to turn it into one, saying 'thou shalt do this,' and going towards computer solutions...I think you should be allowed to design, and approach an analysis, in the way that's suited to you as a person. We're not all the same. It's got to be flexible, not regimented.. a lot of it is person to person contact. If you don't get on, the methodology doesn't matter: you've got to have that interpersonal communication... "

(Q: How far does that come from an analyst's training, and how far from experience?)

"I - personally - think it's by experience, I think we can learn from other people. Training on the job: watching, learning, learning by mistakes... it's a matter of personal skills. .. A lot of it is being able to talk professionally: get them to accept you as a professional, and you respect them in their field. That way, they become involved, because you're picking their brains."

Jim, on the other hand, referred to the change he perceived to be occurring, within systems development approaches:

"I think we're moving more towards a prototyping situation, depending on the size and complexity of the system. PE 29 is fairly simple; you have a Personnel record, training record, sickness absence, holidays... however big it is - even 35,000 people - it's still fairly simple. On the other hand, Housing and Housing Benefit, the Poll Tax - LSDM might be vital to control and understand that."

When the CPIS project began, part of the rationale for adopting LSDM as a methodology was that it was expected to become a standard approach in Computer Services. I asked the Computer Services team members how they felt about this, in view of their experience with CPIS. Jill reflected:

"That's difficult to say, if you're using packages. You can only carry it so far. It's very good as a beginning. For users, it's much better than pages of text, it's good for communicating with users. But I can't see it happening; there's too much information to deal with; it takes too long."

Tony, too, expressed reservations:

"That's an awkward question. I think so, but only just. I was keen when we started, but I'm only about 53% in favour now, I've got reservations. For instance, I've never seen anyone go back and update the DFDs, the documentation; you just don't get time. It's like all documentation: you don't want to do it, you want to get

onto the next interesting job".

Correspondingly, there were contrasting comments as to better alternative approaches:

"Ideally, if I was designing a Personnel system, I would have chosen someone that knew what they were doing, as user... You can sense users that know, and users that don't. You've got to get someone forward-thinking, that wants to have an input and knows his field of work. The people from Central Personnel didn't know their field, they were go-betweens... we never got into depth on a particular field, like training."

(Geoff Rogers, Computer Services).

Jim, too, emphasised the importance of close liaison with users; but in contrast with Geoff, he stressed what he saw as the user's right to make decisions - even 'wrong' or cumbersome decisions - and, as mentioned above, saw prototyping approaches as the most flexible and effective ones in many settings.

6.4. Discussion:

6.4.1. The Systems Development Process:

In September 1988, at the end of two years' intensive work, the CPIS team had a pilot system which they felt, with some reservations, could meet both Central Personnel needs and local, departmental needs. In the process, a major change of emphasis had taken place, in relation to the project's aims, and the development had taken over a year longer than originally estimated. This delay was a

definite source of demoralisation for the team, and (in view of the long history of delayed or failed development plans), perhaps for Council staff more widely. This demoralisation was compounded by more fundamental uncertainties about how widely the system would ever be implemented, because of the budgeting and other organisational changes taking place within the Council. However, the change in the project's aims appeared to be a positive feature: not a failure to meet the original specification, but a flexible response to the needs and views expressed formally and informally, in the early stages of systems analysis, by prospective user departments.

How far did the use of the structured analysis and design methodology contribute to these outcomes? Any evaluation is made more complicated by the fact that LSDM was new to the whole team. This fact clearly contributed to a shift in the balance of power, in favour of the team's 'non-technical' Personnel members. In this context, the jargon associated with the methodology seemed less important than the use of the data flow diagrams; these were used very successfully as communications tools. But the mass of documentation generated proved too unwieldy, and too abstract, to support the design process in the ways originally intended. Instead, informal contacts - and the exercise of skill and discretion, both by analyst programmers and by Personnel members on the CPIS team - proved decisive.

More generally, three aspects of the CPIS development do bear out some of the critiques of structured methodologies which were discussed in Chapter Three. Firstly, inflexibility: team members came to view close adherence to the 'life-cycle' stages of the methodology as restrictive, and found that they could only formulate decisive comments when specific screen displays were available to be discussed and modified. (Ehn, 1988; Land et al, 1983; McCracken and Jackson, 1982).

Secondly, using the method did appear to restrict the scope for individual analyst-programmers to develop personal contact with users, and to exchange ideas with them about computerised or non-computerised options. However, while all three full-time analysts on the project team experienced the structured methodology as cumbersome, abstract and unhelpful at the design stage, it is also clear that two of them found any form of user-involvement over which they had little control another source of frustration. This would suggest that the 'partnership' emphasis adopted for instance by Ehn (1988) - aiming to recognise the skills both of designers and users - is an appropriate aim, but one bound to generate tension. Only one analyst-programmer - the most junior, and the most recently trained - expressed the view that decision-taking initiative and scope should clearly be with the users.

Thirdly, the narrow emphasis in LSDM on developing a particular computerised 'solution' appeared to compound some of the difficulties which were inherent in the

project from the beginning. Issues such as the changes in Council budgeting processes, the moves towards decentralising both Central Personnel and Computer Services departments, or the job design implications of the new system were invisible, from the narrow standpoint of a 'hard' methodology. (Hirschheim, 1985, 1987; Land et al, op cit). Yet all these factors posed implicit threats to the eventual completion of the project, either in the form of lack of funding, or in the form of resistance, dissatisfaction and stress among eventual users.

In the early stages, the use of LSDM appeared to facilitate user-involvement, through providing a common starting-point and 'communications base' (the Data Flow Diagrams) for both 'technical' and 'non-technical' team members. (c.f. LBMS 1986). However, DFDs are not unique to methods such as LSDM, and the later stages of the methodology proved problematic for the whole project team, in a number of different ways, outlined above. Personnel 'users' on the project team came to contribute in a more sustained way than had originally been envisaged; those from Council departments, on the other hand - the eventual 'end-users' - contributed a great deal of information, but had almost no direct influence over what would be computerised and how.

Within this context, women clerical workers did emerge as crucial sources of detailed information, for the CPIS team. There were also indications that - where there

were opportunities - they expressed considerable interest in using the system to make some tasks easier, such as the compiling of statistics. However, the structure of the CPIS team, and its use of a 'hard' methodology, fitted in with pre-existing hierarchies in Personnel work, within which there were no opportunities for clerical workers to make their own experience or contributions more visible or formalised.

Interestingly, however, the CPIS development did illustrate the kinds of tension which can be generated by sustained and close cooperation between 'users' (defined as 'non-technical') and systems designers. In order to remain as fully involved as they came to wish, the Personnel team members had to develop a range of formal and informal strategies which were entirely independent of the structured development methodology itself. The definitions of 'technical' and 'non-technical' activities themselves appeared subject to shifting interpretations. The Personnel project leader became "quite a technical user" for some of his Computer Services colleagues, by virtue of his overall grasp of design features and processes. But for others, he (and the other Personnel team members) clearly remained outside the 'technical' sphere, because they did not carry out basic programming operations. While one Personnel team member had expressed interest in learning about precisely this, such interest was not welcomed by most of the Computer Services staff on the team, and no resources or facilities were available to support it.

6.4.2. The clerical labour process:

The delays in the CPIS project, which I have already described, severely limit what can be said about the eventual use of the system within Personnel work. Team members knew that the system would be available to users who would range from managers making occasional requests for reports, to clerical workers who would use and maintain it on a day-to-day basis. As a minimum, two potential problem areas can be identified, which were never addressed thoroughly during the development process.

The first concerns the initial data input required to operate the system at all. By definition, a significant amount of data entry and data transfer from existing records, would be required, in order to create a comprehensive and genuinely corporate database. Yet no resources were allocated to carry this out. In the absence of a separate budget to cover it, existing clerical staff would be the only available people to deal with this, with consequent implications in terms of greatly increased VDU use, of a routine and repetitive nature, for an indeterminate period. Since this would have to be negotiated within the terms of the prevailing New Technology Agreement, in terms of which there had been previous disputes concerning VDU use, the likelihood of problems and delays was considerable.

The second, and related, issue is the one of job design in

the medium- and long-term. Job design in relation to VDU use was already an issue in other City Council departments, as described in the introduction to Chapter Seven. This was not discussed at all during the two-year CPIS development process. Significant positive opportunities to improve clerical opportunities and job satisfaction were missed; yet policies were in place which could have facilitated the exploration of these opportunities: that is, both the 'Clerical Workers' Development Programme' referred to in Chapter Seven, and agreed between NALGO and the Central Personnel department itself, and NALGO's own successful experience of negotiating changes in job design and working conditions for data preparation staff.

In comparison with East End Engineering, the City Council in general offered better terms and conditions for women employees; there was also some commitment to the development of policies to address gender (and race) inequality. At the time of the case-study, a number of equal opportunities policies and initiatives were in place. However, these were largely oriented to monitoring and improving recruitment practices, rather than to changing patterns and practices which affected the opportunities of the existing workforce. (See Chapter Seven and Chapter Nine).

By 1988, there were indications that - in a national sense - support for Council Women's Units and Women's Committees was waning. There is also recent evidence to suggest that

equal opportunities which concentrate on recruitment practices in isolation are likely to be relatively weak (Webb and Liff, 1988). Certainly, in the absence of innovative policies to create new opportunities for training and promotion within the organisation, the proportions of women at the higher levels of City Council computing and personnel work seem unlikely to improve, since there is little prospect of widespread new recruitment: political and financial constraints on local government mean that Council workforces are now likely to be reduced rather than expanded.

The CPIS project itself was seen, by Personnel staff on the team, as offering an important means of establishing effective equal opportunities monitoring, on a corporate basis. In September 1988, Paul Yates commented that external pressure on the City Council, from the Commission for Racial Equality, was the one useful factor he could identify, in trying to persuade departments to implement the system.

Yet in general, the CPIS development process tended to reinforce prevailing gender divisions and inequalities, rather than challenging them. Formally, women were very under-represented on the project development team, mirroring existing hierarchies in personnel work and in computing. Informally, the language and culture of team meetings were very male-dominated. The adoption of a 'hard' systems development methodology, with an emphasis on computerised solutions rather than organisational

processes, also tended to marginalise the skills, the interests and the participation of potential clerical 'users': although their informal cooperation was essential, it received no recognition.

The overall marginalisation of social or organisational issues or processes also had a specific gender dimension: the 'end-users' - almost all women clerical workers - were the ones most exposed to the adverse consequences of unplanned and unresourced increases in VDU-based work, or of missed opportunities for training in the use and further development of the computerised personnel information system. (Goodman and Perby, 1985; Murray, 1987; Liff, 1990). The new system itself - if and when fully-implemented - promised thorough monitoring of equal opportunities policies in recruitment practices, for the first time, as well as the opportunity to compile detailed statistics on the proportions of women, Black people and disabled people within the Council workforce. But at the same time, the systems development process itself reinforced a number of the ways in which women clerical workers were already at a disadvantage, by allowing a drift towards a greater proportion of routine, VDU-based work in clerical grades, and by contributing to widening rather than reducing the gap between these kinds of jobs and those involving recognised forms of technical and systems-related skills and activities.

Conclusion:

In this chapter, I have provided an account of a major systems analysis and design methodology in use - and one which emphasises the importance of user-involvement (LBMS, 1986). In contrast with the processes described at East End Engineering and at City Libraries, in this example user-involvement was established on a formal basis. However, active involvement was restricted to three professional Personnel staff members; their clerical colleagues provided crucial information, but exercised no direct influence.

An analysis of the systems development process over a two year period revealed significant problems associated with the use of this 'structured' methodology. Firstly, strict adherence to the 'life-cycle' stages of the methodology appeared to inhibit flexible and effective design work, for which both users and analyst-programmers needed to see concrete examples of systems features. Secondly, a number of unresolved tensions were in evidence, between 'user' and 'computing expert' members of the project team; in many respects, users retained the initiative - through the exercise of their own professional expertise, and to some degree because the design methodology was new to their computing colleagues as well as to themselves. Interactions between 'users' and 'experts' illustrated the ways in which 'technical' work may be defined quite narrowly (e.g. writing code) or quite broadly (gaining a grasp of a system's general structure). Thirdly, the

adoption of this particular design methodology, based on a relatively narrow definition of systems development, contributed to a general marginalisation of social and organisational issues. This undermined the viability of the project as a whole, when for example organisational restructuring and budgeting changes overtook it; from a gender perspective, important opportunities to safeguard to to improve clerical working conditions and opportunities were lost.

PART FOUR:

NEW APPROACHES TO USER-INVOLVEMENT IN DEVELOPING NEW
INFORMATION SYSTEMS.

INTRODUCTION:

In the three preceding parts of this thesis, I have concentrated on clarifying the context in which researchers interested in current forms of Human-Centred Systems research find themselves. In the first part, I reviewed research into IT use in office work, into re-evaluations of clerical skills, and into gendered patterns in the design and use of technologies. In the second part, I moved on to discuss both a range of prescriptive information systems design methodologies, and broader research perspectives in computer science, including Human-Centred Systems approaches and other interdisciplinary initiatives. In the third part, I examined three case-study examples of information systems development and use; these illustrated both a number of general issues concerning user-involvement, and some aspects of the ways in which gender relations are reflected and reproduced through systems development methodologies and practices.

In all three sections, I identified some factors which are contributing to increased opportunities for 'user-involvement' in information systems development. However, I also found that the terms 'user' and 'user-involvement' are open to many interpretations, both in practice and in research contexts. While Chapter Seven provided a clear example of the problems which can be attributed to the absence of user-involvement, for example, Chapter Eight illustrated the ambiguities which can arise when a very

small number of professional 'users' have to represent both senior management and clerical interests. Chapter Six demonstrated considerable potential for clerical involvement in prototyping approaches; however, entrenched gender inequalities within the organisation in question - and in the local labour market - appeared to rule out any broad improvement in opportunities for the women clerical workers concerned.

In Chapters Nine and Ten, I depart from the approach taken in the preceding three chapters, based on interviews and observation, and analyse the experience of collaboration, on an 'action research' basis, between the Human-Centred Office Systems project and staff and management at City Libraries. My objectives here are quite specific. Firstly, having identified a willingness within City Libraries to take part in a user-oriented approach to systems development, I aim to assess the scope arising from this for library assistant (i.e. clerical grade) participation. Secondly, I aim to describe the use of two particular techniques for systems development - study circles and the formation of a broad-based design team - and to examine the issues, problems and priorities raised by participants during these processes. Thirdly, in Chapter Ten I aim to assess what contribution these techniques may be able to make towards gender-aware initiatives in office information systems development, within or beyond the Human-Centred Systems tradition.

CHAPTER NINE:

CITY LIBRARIES: A REAL TURNING POINT?

INTRODUCTION:

In concluding Chapter Seven, I referred to the interest expressed by both staff and management at City Libraries in exploring new approaches to information systems development. There was unanimous dissatisfaction with previous systems development approaches, and a strong desire to create both a development or acquisition process, and a new system, which could reflect City Libraries' own policies and practices, and operate independently of the local authority Computer Services section. However, within City Libraries itself, no group or individual felt they had identified a good alternative model. There was therefore considerable interest, on the part of management, in taking part in a period of collaborative research which had the potential to define such a model, and to begin to implement and to assess it.

In pursuit of the objectives outlined in the Introduction to Part Four, I have organised this chapter as follows. The first section takes up some of the general themes discussed in Chapter Eight, concerning City Libraries, in order to make clear the kind of basis that existed in the organisation for a Human-Centred Systems research initiative. The second section describes the main techniques adopted during the research, and explains why

these were considered appropriate. The third section summarises the sequence of collaborative activities, undertaken between October 1986 and December 1990. In the fourth section, I reflect on this long period of collaborative work, in relation to the first two research objectives stated in the introduction to Part Four - that is, an assessment of the scope for clerical participation, and of the study circle and project team methods. Then in Chapter Ten, I turn to the third research objective referred to at the beginning of Part Four: an analysis of the City Libraries project in the context of Human-Centred Systems research, and of broader social science analyses of information systems development - including those from gender perspectives.

9.1 City Libraries: the Basis for Collaborative Research:

At the outset, it is worth highlighting three key features which made collaborative research with City Libraries possible.

Firstly, 'Northfield Council', the local authority of which City Libraries was a department, was one of a number of similar organisations which developed radical policies during the 1980s. Generally speaking, these policies were intended to promote local democracy, and the development of innovative public service provision. This brought these Labour-controlled authorities into inevitable conflict with a Conservative central government whose policies were constructed upon the notion of individual choice and effort, the privatisation of publicly-owned

resources such as transport and energy, and 'market values' in general.

Northfield Council, for example, had initiated schemes to promote local training and employment, and had established specialist units to address inequalities of race and gender. The council had also supported both a Women's Technology Training Workshop, and a community-based initiative to create access to information technology for unemployed people. These initiatives shared a number of the concerns which have characterised HCS research, notably a focus on shaping technology to fit employment or community needs, rather than vice versa. Such a context could, thus, offer some potential for new approaches to information systems development.

Interestingly, however, these innovative approaches to IT were not reflected in Northfield Council's own internal strategies and practices concerning staffing, or systems development, use and training. No links or dialogues appeared to have been established, between policy structures and debates on IT and those concerning equal opportunities (See chapters Seven and Eight, and Pemberton, 1986). As Pam Linn has illustrated in the context of the Technology Networks pioneered by the GLC during the 1980s, these forms of radical initiative have not always proved very amenable to acknowledging or addressing gender inequalities, or gendered assumptions underlying prevailing definitions of 'technical' products or processes (Linn, 1987). These factors underline the

importance of examining carefully the context which an organisation such as Northfield Council could offer for HCS initiatives.

Secondly, although City Libraries was a small department in the Council context, as a major public library it had taken a leading role in policy and service development, both locally and nationally. This included playing a substantial part in the establishment of the 'Libraries Campaign', in 1987; the aim of this was to mobilise active public support for libraries, at a time when many were experiencing major cutbacks in resources. In addition, following the appointment of a new Director in 1983, City Libraries began to develop a model of librarianship which emphasised community links and outreach work: an expansion of the traditional 'custodial' model, based on book-lending and reference services. This more complex role in turn required a higher degree of staff development and consultation. As part of this, from 1984 management took up a trade union (NALGO) proposal to improve pay and career development opportunities for non-professional staff (library and information assistants) on clerical grades. Broadly speaking, through this 'alternative grading' scheme, management recognised that there was an increasing degree of overlap between library assistants' skills and experience and those of their professional colleagues. At this point, 395 of the 400 library/information assistants at City Libraries were women. The alternative grading scheme therefore

represented an important move in the direction of improving women's pay and status within the organisation.

Thirdly, three 'generations' of library information system coexisted at City Libraries, by the mid-1980s. A small number of branches and sections still operated entirely on a manual basis, using card-catalogues and issuing books in return for cardboard tickets under the traditional 'Browne' system. The majority of the service relied on the batch-processing system described in Chapter Seven. Then, in a small number of sections - for instance, parts of the Central Lending Library - staff had on-line access to specialist databases outside City Libraries. Some professional librarians (all male) had also taught themselves to construct their own databases on PCs, for example to house details of the drama collection and to deal with staff timetabling in the Central Lending library. Experience of these facilities, combined with rising public expectations, led management in particular to see the acquisition of an on-line, integrated library system as the only way to sustain a high standard of service provision.

At the time of the case-study, such systems were becoming available from at least eight major suppliers; being largely parameter-driven, they could be adapted in substantial respects to local requirements. At City Libraries, the departmental management team took the view that such a system would not be expected to facilitate reductions in staffing, but to underpin improvements in

service provision and in working conditions. A key concern on the management team's part was to undertake 'consultation' with staff over new phases of computerisation, since they attributed many of the failings of the batch-processed system to the total lack of user-involvement documented in Chapter Seven.

In 1985, the deputy departmental director (Kevin Crabbe) and another assistant director (Dick Sinclair) had taken responsibility for drafting a specification for a new integrated library system. However, although they had begun to assemble information both from systems suppliers and from libraries already operating such systems, pressure of work - perhaps combined with a degree of uncertainty about how to proceed - had largely brought this undertaking to a halt, as Dick Sinclair explained:

"It's getting enough time off to do it. I suspect I need to clear a week just to do it, and clearing a week is difficult... I can give myself a couple of days; I spend most of the first day reprising on what I've done before, and then the second day is really getting down and writing the next bit. Then I go back into the meeting cycle and it slips. It's a very inefficient way of working."

To sum up then, three aspects of City Libraries as an organisation created a sound basis for the exploration of new approaches to user-involvement in information systems development. Firstly, among both management and staff there was a commitment to improving service delivery and working conditions; this included an increasing

recognition of gender issues (in the context of wider concerns with equality in employment and in service provision). Secondly, the scope of clerical-grade posts was being reviewed, and some new opportunities for career development were being created. Thirdly, existing information systems (both manual and computerised) were widely seen as inadequate; in addition, existing managerial and professional structures for making IT-related decisions had become too cumbersome to be effective. Both staff and management saw broad forms of 'user-involvement' (albeit ill-defined) as essential to any new phases of computerisation.

In this context, in the autumn of 1986 both management and the NALGO shop stewards' committee at City Libraries agreed to a period of 'action research', in which professional and clerical staff and managers would take part. In this collaborative framework, the research team role was to include facilitating staff discussions on library systems development, and supplying feedback on progress to the departmental management. My specific role was to address the issue of library assistant involvement, beginning with the study circle initiative. Final responsibility for any decisions regarding internal City Libraries action remained with this management team. The techniques and approaches adopted, in the course of this collaboration, are discussed in the following sections.

9.2 Identifying appropriate techniques:

From the brief outline above, it is possible to see that City Libraries offered very favourable circumstances for developing 'gender-aware' forms of HCS approach. In contrast with East End Engineering and with the Central Personnel department of the city council, gender issues were already under discussion. Gender divisions were apparent in relation to IT, as was outlined in Chapter Seven: both formal computing posts and informal IT initiatives were generally taken up by men in professional posts. But given the prevailing ambivalence towards existing computerisation, this could not really be seen as a secure form of male 'tenure' of technology (McNeil, 1987).

However, it is important to note that these patterns had not been addressed by existing equal opportunities or gender initiatives in City Libraries. This suggests considerable potential for them to become entrenched and taken for granted. The women professional librarians (including the departmental Director) who led initiatives on gender inequality had become committed to priorities which perhaps seemed both more immediate and more amenable to their intervention: new training opportunities, in assertiveness and in management skills, for professional and non-professional women staff; the researching and writing of a report on equal opportunities for the Council Women's Unit; the negotiation of an improved maternity

leave scheme, and the establishment of a support network for staff on maternity leave. Nevertheless, pressure of day-to-day demands on management, combined with the departmental director's own commitment to a critical assessment of IT, meant that considerable scope existed to broaden the terms in which new systems, and new practices, might be debated and defined.

In Chapter Three, I referred to McCracken and Jackson's image of the 'user' as supermarket shopper - deprived, when inflexible methodologies are used, of the opportunity to "roam the aisles", considering what ingredients to buy, or whether to go out for dinner instead. (McCracken and Jackson, 1982). Extending the image a little, it could be suggested that at City Libraries, in the autumn of 1986, a whole household of potential shoppers were still at home: peering into a half-empty larder, weighing up the pros and cons of the supermarket, the wholefood shop, or buying in a professional caterer - and wondering who among themselves could or should be involved in making the decisions.

There was a clear need, therefore, for different perspectives to be articulated, concerning the options for future phases of library computerisation. In line with the Human-Centred Systems emphasis on enhancing the skills and the working conditions of 'basic-grade' systems users, my initial focus was on the question of library assistant involvement. At City Libraries, library assistants were the most intensive users of all three 'generations' of

information system; however, they had little time or opportunity to reflect on their experience, or to formulate their concerns about future computerisation.

As outlined in Chapter Five, I chose the 'study circle' technique as the one most appropriate to initiate further research and collaboration, in this context. In Chapters Four and Five, I discussed the ways in which this method has been adopted by trade unions and by researchers, particularly in Scandinavia, in connection with the design and implementation of information systems (Olerup et al, 1985; Vehvilainen, 1986, 1991). Although both the TUC and some trade unions with large female memberships have made use of study circles in the UK, this has been in a general, educational context rather than one addressing IT or systems development. The Scandinavian research discussed in Chapters Four and Five suggests that the active and open-ended nature of the study circle process can enable women systems users, in particular, both to reflect on their experience and to take an active part in systems development and implementation processes (Avner, forthcoming in 1993)^{*} - providing the opportunity for exploration and debate which appeared to be the first priority at City Libraries.

The second systems development method described in sections 9.3 and 9.4 is the establishment of a design or project team. This has become an increasingly common approach in a variety of systems development approaches (Friedman and Cornford, 1989; Willcocks and Mason, 1987;

^{*} in Green et al (eds) 1993

and see Chapter Eight). However, in contrast with the team established in City Personnel, and discussed in Chapter Eight, the one established at City Libraries was set up in response to specific proposals put forward by study circle participants, rather than having been initiated by managers, or by systems analysts. The mixed design team structure was seen as appropriate by study circle members because they viewed it as an opportunity for staff with different skills, backgrounds and responsibilities to negotiate over the planning, design and implementation of a new system. (See study circle report attached in Appendix E).

From my own research perspective, therefore, the study circle and design team approaches provided a number of important opportunities. Firstly, Scandinavian research suggested that the study circle method might be particularly appropriate for women IT users. In terms of HCS research in the UK, therefore, collaboration with City Libraries offered an opportunity to assess its strengths and weaknesses with particular reference to gender relations.

Secondly, the mixed design team itself represented an example of an initiative put forward by women study circle members. With a membership including women library assistants, professional staff (including computing staff), middle and senior managers and researchers, observation of the team's work offered a unique opportunity to examine the ways in which systems

development issues may be defined and negotiated on a basis of broad user-involvement, rather than on the narrower basis associated with methodologies such as SSADM (see Chapter Eight). Appendix C provides a summary of the team's structure and membership, both when it was first convened and in the form arrived at in 1991.

Thirdly, City Libraries offered an opportunity to analyse how far HCS principles and practices might be developed in a context in which hardware and software would be bought in and adapted - rather than being developed as prototypes, as they were in early examples of HCS research (Rosenbrock, 1989; Gill, 1990, Kirkby, 1991).

9.3 The 'Action Research' Process: a Summary of Events:

Sept-Oct 1986 Following analysis of the interviews carried out in Bibliographical Services, (discussed in Chapter Seven), preliminary approaches made to the departmental management team (DMT) and to NALGO, to discuss the possibility of inviting library assistants to take part in study circles.

With their general agreement, the study circle proposal was raised for discussion at staff meetings in the Central Library, following the circulation of a leaflet outlining the proposal. A number of library assistants expressed interest, and agreement was reached for six to form a group.

March 1987 First Study Circle meeting: introductory discussion, and drawing up of a preliminary agenda. (A sample programme is attached in Appendix D).

- July 1987 Final Study Circle meeting: completion of report (attached in Appendix E), and circulation to DMT.
- Sept. 1987 Study Circle members' presentation of their report to DMT; proposals for further study circles and for a design team accepted.
- Oct. 1987 Research interviews carried out with the six study circle members.
- Design team convened, chaired by the Computer Development Librarian.
- Nov-Dec 1987 Visits to all sections/branches by library assistants from the first study circle. Members for four more groups agreed.
- 1988 Monthly meetings of the design team, discussing its 'brief' and planning how to proceed.
- Four more study circles convened, facilitated jointly by a member of the first group and a researcher.
- Feb. 1989 HCOSP/Libraries seminar convened, to address uncertainties being experienced by the Design Team. This resulted in an increase in library assistant representation, improved communications with management the the trade union branch, and a revised structure.
- Feb-Jun. 1989 Continued work by the design team on the systems specification, now meeting weekly for half-day sessions. Active involvement of more staff, through sub-groups working on job design, training, health and safety.
- Research interviews carried out with ten library assistants who had taken part in study circles.
- July 1989 Organisation of a day seminar for library systems suppliers, outlining proposals for user-involvement.
- Departure of the departmental director (to a directorship elsewhere), to be

replaced by the former deputy director.

- Sept 1989 Design team review of the seminar for suppliers, and planning for the evaluation of systems and suppliers.
- Decision made to arrange site visits (for design team members) and systems demonstrations open to all City Libraries staff. Questionnaires to be developed to record assessments of both.
- Oct-Dec 1989 Completion and circulation of the first draft systems specification. Library assistants on the design team draft initial evaluation questions, for design team discussion.
- April 1990 Evaluation questionnaires completed (example in Appendix H).
- Two further study circles convened, at the request of library assistants who had not been able to take part in earlier groups (particularly part-time staff).
- May-Oct 1990 Three site visits completed (attended by design team members); eight systems demonstrations held, in City Libraries; over 30% of staff attended one or more.
- Oct-Dec 1990 Analysis of evaluation questionnaires, leading to a shortlist of three suppliers, recommended to the management team by the design team.
- Jan 1991 Loss of forty staff from City Libraries under a Council-wide voluntary redundancy scheme, arising from a budget crisis affecting all departments.
- Capital allocation for a new library system confirmed as still available, but purchase deferred until the financial year 1992-93.
- July 1991 Reorganisation of the design team, as outlined on the final sheet of Appendix C. Appendices F and G contain two further Study Circle reports.

9.4 Study Circles and the Project Team: an Assessment:

The brief summary in the preceding section indicates that both the study circles and the design team achieved sustained library assistant involvement, despite the initial difficulties experienced by the design team. In this section I begin by identifying the factors which created scope for this degree of participation; I then turn to an assessment of the strengths and the weaknesses of the study circle and design team processes.

9.4.1 Scope for Clerical User Involvement:

Research from other sources, in addition to the case-studies described in Chapters Six and Eight, has already indicated a trend towards increasing concern with user relations, in connection with information systems development processes (Hirschheim, 1985; Bjorn-Andersen, 1987; Friedman and Cornford, 1989; Greenbaum and Kyng, 1991). However, as Friedman and Cornford usefully point out, 'user-involvement' has come to mean different things to different people - in the sense of whether 'users' are defined as managerial, or in a broader way, and also in the sense of how active and influential they are able to be (1989, Chapter 11). In Chapters Six and Eight, I found discussed differing examples of clerical contributions to systems development. However, I also found that gender inequalities within organisations, and in the local labour market, tended to restrict this to limited informal initiatives.

In terms of the distinctions made by Land (1982), between 'consultative', 'democratic' and 'responsible' forms of user participation, an analysis of the study circle and project team processes reveals that both extended beyond the limitations of consultation, and included aspects of both the second and the third forms. 'Users' at both professional and clerical levels shared in decision-making, as in the 'democratic' mode. Although the departmental management team retained overall authority, the 'advisory' role of the project team expanded to take on aspects of 'responsible' participation, as team members gained confidence through creating a specification, meeting systems suppliers and evaluating systems - detailed work of which the management team had no direct experience. What the City Libraries example adds to existing research on user-involvement and human-centred systems is an analysis of the specific factors which can influence the scope for women clerical workers to take part in processes of systems planning and development. Three factors were particularly salient: firstly, the nature of the dissatisfaction, at all levels, with existing systems and approaches to IT; secondly, the nature and extent of clerical skills, in general and in relation to IT; and thirdly, increased acknowledgement of 'user relations' issues among systems suppliers.

(i) Dissatisfaction with previous systems in City Libraries:

Study circle discussions added graphic detail to the

general points illustrated earlier, with respect to the 'layers' of catalogue facilities in City Libraries. Jane, at 18 the youngest member of the first study circle, described her impressions after a move from branch library work to the Commerce, Science and Technology reference section in the Central Library:

"There are four parts to the catalogue system now: the card catalogue up to 1970; the card catalogue from 1970 to 1985; then the microfiche, and then the on-line short title file. So it all depends when a book was published, and to some extent you get to know where things are anyway... You have to guess from the title, if there's no date to go by, and work backwards or forwards from there... The short title file looked very difficult to use at first; it is easy, in fact, but it's a more lengthy process than it should be. The ends of titles are truncated [to fit into fixed fields]; that's most difficult with science stock. And government publications: you can get twenty publications where the titles all start the same; it's very difficult unless you've got the ISBN number. You have to be more careful, more knowledgeable, than with the card catalogues. It's not 'user-friendly'; there's no help screen, and often you're just left in the lurch to muddle through."

This description illustrated one of the reasons for management apprehension about new phases of computerisation. In a context in which manual and computerised systems continued to coexist, library

assistants had learnt to work around the inadequacies of each, often thanks to accumulated and partly tacit knowledge: "you get to know where things are anyway." (c.f. Goodman and Perby, 1985; Lie and Rasmussen, 1985). In addition to the points made above, Janis also described how reference staff had informally created their own manual indexes, to facilitate access to specialised material such as government reports. However, an integrated library system would be built around one central database: poor data quality, or cumbersome forms of access, would have the potential to transmit errors and frustrations around the entire library service.

In the Central Lending section, Dinah - looking back over twelve years of library experience, since leaving school - described how she and other new library assistant first encountered 'the computer' in the mid-1970s, in a manner which clearly located them as 'novices' dealing with something both mysterious and fragile:

"I was very overawed, actually, because - when I started - you were sort of kept away from it, for the first couple of weeks. And the public - you weren't let loose on the public or the issuing system for the first few weeks (laughs); you were locked away in the work room to jacket books... and we used to practise with - we used to call it a 'spin-drier', it was a tall thing where you put cassette tapes in, and you had to practise on that, you weren't allowed to use the actual terminals to start with. So you thought it was much more complicated than it

actually was. Nobody really explained what was happening behind the scenes; you thought that if you did press the wrong button, or you used the pen wrong, then you were going to really mess it up. And it's not the case at all! (Laughs)."

By the mid-1980s, computer use on the counter had become a matter of routine, and new library assistants were no longer hidden away to practise on the 'spin-drier'. But while the connotations of computer use had changed, they had not become any more positive for women library assistants, as Dinah illustrated:

"I think the counter work has become easier, in some respects, and quicker. But it has taken what little personal contact there was away from the central library. It's perhaps not so much the same in branches, because there's less people going through. But I understand that they always used to refer to people by name, when they were giving them the little cardboard tickets back... and perhaps spent more time with people. Whereas now it's so quick: you shove people through... So I think that a lot of people feel, if they're just starting out, that all we are is computer operators. Again, that's changing, because of gradings and things like that... but I think a lot of people feel that they're not librarians or library assistants any more, they operate a computer."

In this sense, then, speed of throughput had been achieved with the batch-processing circulation control system - but at the expense of factors such as job satisfaction and

contact with the public. At a more fundamental level, one kind of gendered pattern had been overlaid upon another. During the 1970s, women library assistants experienced computers as fragile and remote objects, likely to expose the inexperienced user to unspecified disasters; by the 1980s, they were describing the passive 'operator' role discussed in depth by Cockburn (1985). The common element was a lack of control - either through direct day-to-day procedures, or through a general awareness of what happened 'behind the scenes'.

Many male professional librarians, in contrast, clearly felt free to experiment with information technology. Dinah described this contrast:

"The men in our section are very sort-of enthusiastic about it; anything that came along new technology-wise, whether it was good or bad, whether it worked or not, was 'super'... suddenly you had to do everything on that piece of equipment; quite honestly, sometimes we used to think, well how did we do the job before? Because they couldn't do anything unless they used that terminal. Having said that, they were both professional staff...

I think perhaps sometimes the women were a little bit 'oh, we didn't come into libraries to work with new technology...', perhaps feeling that they were getting to be - you know - a keyboard operator rather than [part of] a personal service."

Dinah and her colleague Julie, another Central Lending

library assistant study circle participant, went on to describe how the two men referred to here had set up a staff timetabling system on a PC. It proved so much more time-consuming to use than the manual timetabling procedure that both women refused to operate it, unless it could be improved; in the interim, it remained in use for professional diary-keeping, but library assistants returned to the previous manual system.

Gendered patterns were clearly in evidence, therefore, interwoven with the professional/non-professional distinction. These linked patterns contributed to an increasing tension between cumbersome forms of computerisation, and the new, more flexible and outreach-oriented approaches being promoted by City Libraries' senior management, with their associated career development possibilities for library assistants. For the departmental director, and for some of her management team colleagues, it was an increasing awareness of the threats posed to new Libraries policies by this tension which had created a new willingness to discuss computerisation possibilities with basic-grade women staff.

(ii) Clerical skills, in relation to information systems development and use:

In Chapter One I discussed a number of studies which have demonstrated a considerable range of skills and experience within clerical work, both before and after the introduction of computers. Analyses of the ways in which clerical skills have been defined, and devalued, in gender

terms have added a new dimension to more long-established critiques of Braverman's deskilling thesis (Kusterer, 1977; Cockburn, 1983; Gaskell, 1987; Knights and Willmott, 1990; Webster, 1990). However, with some notable Scandinavian exceptions, the contributions to this research which concern clerical work have focussed on office workers' experience of the introduction and use of information technology, rather than on the actual design and development of systems (Olerup et al, 1985; Tijdens et al, 1989; Eriksson et al, 1991).

Library assistant posts have in common with many other areas of office work a combination of basic clerical activities (book-issuing, entering catalogue records) and dealing with less formal or predictable processes. As described by study circle participants, these processes included, for example, responding to borrower enquiries; taking responsibility for a particular subject area; supporting community access to facilities such as word-processing; organising a children's computer club. As Janis's comment above indicated, study circle participants generally considered that the range of computerised facilities in City Libraries had required them to extend and develop their skills, rather than decreasing the importance of these. Dinah, the Central Lending Library team leader quoted above, also emphasised the interpersonal skills which she considered essential to her job. Again, she brought out a number of aspects which commonly form part of jobs defined as 'women's work':

"Your personal attitude's very important, especially when you're dealing with the public. I think you've got to be able to listen to people. And also - if you're in a supervisory post, you've got to be able to listen. We've got such a young staff - a lot of young women... you know, you've often got to be prepared to listen to their personal problems as well, they'd got some problem at home or they were unhappy at work. I think you found that being a lot of young women together, and then ... the first level of management being a man - they did come to the team leaders a lot, rather than go and speak to the sub-librarian, often... You've also got to be aware, sort of current awareness of what is going off, for subject enquiries... you've got to be alert; and work well together - so that if you can't bring it to mind, that perhaps you can go and ask somebody else. You've got to be prepared to give and take, and not think that you can know everything."

Management commitment to the alternative grading scheme - and subsequently to the programme of study circles - illustrated their perception of the importance of library assistants' skills and experience, both in terms of the general delivery of a high standard of service, and in terms of IT developments (c.f. Kubicek, 1983; Williams, 1987). However, extending this commitment to incorporating recognition of library assistant skills in the systems development process, notably into the systems specification, proved very complex; the ways in which it

was achieved - as well as those in which it was not - are discussed below in section four.

(iii) *Increasing Acknowledgement of User Relations Issues Among Systems Suppliers*

Changes in the library systems market, and in patterns of recruitment to systems suppliers, also played a part in creating a climate favourable to library assistant participation. All of the eight firms who demonstrated their systems at City Libraries had recruited professional librarians to their staff. As in other areas of the computing industry, women librarians were more numerous in sales, marketing and training, while men predominated in software engineering (Cockburn, 1985; Faulkner and Arnold, 1985). Over half the firms were specialists in library systems, and in these examples, professional librarians had played a central part in the original design processes.

However, the design team's own evaluations of this range of systems indicated that those designed with the most long-established professional librarian involvement did not necessarily come closest to meeting their agreed specification. One system, for example, had been developed over a ten year period by a cooperative organisation of libraries in the Midlands, starting from a concern to establish a common catalogue structure. New libraries purchasing this system would become cooperative members; typically, the member library's director would have a seat on the cooperative's Board, with rights to

influence subsequent decisions, for instance about priorities for systems enhancements. However, catalogue entries were entered and stored via telecommunications links to a central database in the Midlands, so that all local additions also contributed to a comprehensive, central resource. Through visits and demonstrations, cataloguing staff noted that periodic failures of the telecommunications links, combined with a high volume of data, created considerable delays and frustrations. Thus, although the benefits of cooperative membership were attractive to senior management, the system was not included on the design team's eventual shortlist.

There were also limitations to suppliers' responsiveness to the forms of user participation being developed by City Libraries' design team and study circle members. Concerning the demonstrations which suppliers were invited to provide on-site at City Libraries, the team had explicitly asked for these to include substantial 'hands-on' sessions for staff, and the evaluation questionnaires had been designed to be used in this context. This was seen as an essential means through which non-professional staff could gain an in-depth view of the range of new systems and facilities available. In the event, each supplier did provide some practical sessions, in addition to more formal presentations. However, these were not long enough to permit the planned degree of practical evaluation, so that the emphasis had to shift away from the more detailed questionnaires prepared by the design team, and onto the shortest and most general version. In

addition, some of the particular concerns expressed by library assistants, for instance the health and safety aspects of VDU design and use, evoked very little response from supplier representatives. For some design team members, this early experience of systems suppliers' reluctance or inability to alter standard practices had the positive effect of reinforcing their determination to incorporate a wide range of requirements in the final specification. They were well aware that this crucial document would eventually form the basis of a binding contract with the chosen supplier.

9.4.2 The Study Circle Method: Strengths and Weaknesses:

Strengths and Achievements:

Between 1987 and 1990, over forty women library assistants took part in the study circle process; a total of seven groups were formed, each meeting for between six and eight half-day sessions, arranged to fit into the working day. The women who took part ranged from young, relatively inexperienced staff to those with up to twenty years' experience, some in supervisory positions. In the early groups, most members were full-time; the one third of library assistants who worked part-time were under-represented. The two final study circles, formed in 1990, addressed this problem by prioritising part-time participants, and timing their sessions to minimise clashes with childcare or other constraints.

The study circle initiative did, therefore, represent an entirely new departure, for City Libraries, in terms of involving clerical-grade staff in discussing major issues concerning the future of the service.

In terms of strengths or achievements, three aspects of the study circle process were particularly salient. Firstly, the study circle initiative broke the bureaucratic deadlock that had threatened to stifle effective debate concerning IT in City Libraries. It came to represent a de facto alliance between three parties who all stood to gain from experimenting with new approaches: Pam Chivers, the departmental director, who had maintained a deliberate distance from detailed discussions of specific systems and suppliers, in order to retain a clear focus on political and organisational objectives; women library assistants, to whom previous discussions of IT plans had not been accessible; and the HCOSP team, as researchers.

On the basis of this informal alliance, a number of important changes were achieved. For the first time, large numbers of women library assistants took part in detailed discussions and assessments of IT possibilities, both through the study circles and later through systems demonstrations. Their views were communicated to the departmental management team through study circle reports, and through the systems evaluation questionnaires. This effectively dispelled the view, formerly held by some male managers, that most women non-professional staff had

become too demoralised by their experience of the existing inadequate systems to make any active contribution to new plans. Dinah, from the first study circle, illustrated the ways in which management recognition came to include important informal aspects:

"It [the study circle] certainly made you feel that suddenly other people knew you were around, because you were getting contact with the sort-of higher management. I mean, they may have known you anyway, but it's just that you didn't have much contact with them... just even at coffee breaks, they'd come and sit and talk to you, because suddenly you were a face that they knew. So, I mean, you felt much more confident with them anyway."

Sophie, a member of an early study circle who later joined the design team and also went on to coordinate one of the two final groups, summed up her own view:

"It's been a real turning-point for us, as non-professionals."

Sophie's colleague Lynette, who played a large part both in coordinating study circle meetings and on the design team, secured a regrading through this involvement.

At a formal level, the study circle process led to the devising of new structures to take the systems development process forward: that is, the design group, and its eventual network of sub-groups working on areas such as health and safety, training and job design. Finally, the study circle process also contributed to a general

acknowledgement that internal departmental communications needed attention: for many participants, this was the first opportunity to gain a clear view both of how the computerised library systems fitted together, and of how their own work related to work in other sections or branches.

The second strength of the study circle initiative was that it broke another kind of deadlock, by enabling both participants and researchers to move away from 'taking technology as given' (Linn, 1987; McNeil, 1987; Henwood, forthcoming). The starting-point for study circle activities was members' own questions, observations and aims, regarding current and future forms of library computerisation. Thus, their own experience and skills were immediately acknowledged as authoritative, rather than being marginalised (Suchman and Jordan, 1989). This helped to expose the very limited basis on which most women library assistants had first encountered IT, with all the strong gendered connotations noted above.

Study circle meetings, and subsequent interviews with participants, showed how debates began to emerge about where 'systems' issues ended and 'policy' issues began; in more theoretical terms, it became apparent that the boundary between 'technical' and 'organisational' domains was not absolute, but was open to a degree of negotiation (Williams, 1990; Wajcman, 1991).

The question of system response times, for example, was a

crucial consideration for library assistants; delays of more than a second or two, in penning and issuing or discharging books, could result in unmanageable queues building up at busy service points. At first glance, this appeared to be a 'technical' matter related to system size and processing power. Then on visits to large public libraries in West Yorkshire and in the Midlands, study circle participants began to map out the ways in which organisational priorities shaped these apparently 'technical' systems characteristics. In the West Yorkshire example, the central lending section could only operate at full capacity (e.g. during weekday lunchtimes) if on-line book-ordering and cataloguing facilities in the bibliographical services section were suspended; in the Midlands example, a number of management reporting facilities remained unused because the demands they placed on processing capacity 'degraded' response times at the counter so severely. Library assistants on the City Libraries design team were able to use these observations in their own negotiations with management and with the computer development librarian, over the ways in which the systems specification should be written in order to permit a scrupulous examination of suppliers' claims for their systems' capacities and response times.

Weaknesses in the Study Circle Approach:

Some Scandinavian research has indicated that the advantages offered by small-group work with women, such as

improved communications, or a mutually supportive environment in which to assess technologies, have not equipped women to tackle issues of power and inequality in organisations on a broader and more formal scale. Gronfeldt and Kandrup (1985), for instance, found that their successful establishment of a small, active discussion group of women office workers in the public sector was overtaken by long-term management plans to restructure, and to reduce the clerical labour force. Women clerical workers had remained very under-represented in union hierarchies and in industrial relations procedures.

In the City Libraries context, the study circle approach successfully opened up IT issues for women library assistants, enabling them to contribute actively on a new basis. However, sustained and detailed work on systems development - and on all the wider organisational issues which that came to raise - became the province of the design team, because it was seen as requiring joint discussion and negotiation between management, professional and non-professional staff. That is, the City Libraries example suggests that clerical workers' study circles can be very successful in exposing or challenging taken-for-granted assumptions about gender and information technology, and in establishing a creative framework for user-involvement. However, in themselves they do not have the scope to take systems development forward on an organisation-wide basis. But rather than being an intrinsic weakness of the method, this is a

question of defining it clearly as an appropriate one for the early stages of systems planning and organisational development.

The main weakness in the study circle approach, in the form developed at City Libraries was that it was under-used in some respects. Opportunities to build an informal, long-term support network among library assistants, on the basis of study circle involvement, were not fully explored. Nor was the study circle approach - or any parallel intervention - extended to professional staff or to managers. There were reasons for both of these omissions, but both also contributed to the difficulties eventually experienced by the design team. In the following section I turn to an examination of the design team initiative, and explore these points in greater depth.

9.4.3 The Design Team: Strengths and Weaknesses:

At the most basic level, the City Libraries design team did prove to be a viable means of taking the systems planning and development process forward - in contrast with its more 'top-heavy' predecessor, the 'IT Policy Development Group'. A systems specification was produced and circulated for discussion and amendment; suppliers and systems were evaluated; a shortlist was submitted to the departmental management team, and only a major crisis in local authority funding deferred the acquisition and implementation of the chosen system. Difficulties in

sustaining momentum - and specifically in safeguarding levels of library assistant participation - prompted a degree of reflection and reorganisation during these processes, both in 1989 and then in 1991.

Strengths:

Firstly, then, the design team model did enable its professional, managerial and clerical members to see through a long period of detailed planning for a new library system. No single group, in this range of prospective systems 'users', was consistently dominant. Both current practices, and future systems requirements, were debated in depth, and in this way a number of issues which could have posed major implementation problems were anticipated.

For instance, the acquisition of a new integrated system presented an opportunity to reassess procedures for registering library users. Many issues were uncontentious: all were agreed, for instance, on the ways in which an on-line, city-wide system could be used to prevent fraudulent multiple registration and borrowing. But should new library users be registered directly at a terminal, avoiding completion of the traditional paper form - or should this still be completed and the details entered by library assistants later? The computer development librarian, and some managers, preferred the first option; library assistants and professional staff in the busy Central Library pointed out that this could lead to significant queues and delays at 'peak periods' -

unless extra staff, and extra terminals, could be made available. The range of staff represented on the team ensured that discussion was not limited to apparently cut and dried systems 'options', but uncovered the job design, work organisation and resourcing implications of the proposed new system.

Design team exchanges also brought to life some aspects of the gendered dichotomies which have been discussed in a number of studies of office work and information technology (Olerup et al, 1985; Eriksson et al, 1991). One such example concerned the processing of reminders sent out when library items were overdue. This had been a very sensitive issue for library assistants, who were often on the receiving end of complaints when batch-processed reminders went out for items that had already been returned. In the following extract, the Computer Development Librarian (PB) is responding to a group of library assistants ('LA'), who want a distributed system under branch control, rather than a centralised one:

PB: Why send overdue letters from each service point?

LA: The currency of reminders is important; overdue letters can be a source of friction now.

PB: But you could put a disclaimer in the letter, in case a book had been returned already.

LA: But for instance, elderly people do get very upset; lots of people get upset.

PB: But they are a small percentage. You could have a facility to suppress overdues. It's not just a

question of automatic printing; it can also collate and stamp, it's all automatic.

There are cost implications. Having a large enough stock of paper at each service point would cost a lot of money, and paper might run out in branches.

Here, library assistants' concerns had arisen in the context of daily routines with 'caring' or 'social' features which have historically been defined as 'women's work'. Their day-to-day experience of computer use had also caused them to feel considerable scepticism about information technology. In contrast, the male computer development librarian was quick to respond with 'hard' facts - complaints were 'a small percentage' - and to the image of the streamlined and unproblematic machine, before resorting to the somewhat surprising point that 'paper might run out'.

As the above discussion proceeded, the library assistants gradually ceased to take part; this was not the first or the only occasion on which they had found their descriptions of workplace issues contradicted. Nevertheless, the final system specification did embody a compromise. Library assistant concern with the level of borrower complaints was recorded explicitly, prefacing a requirement that central processing of overdue should be subject to quick and effective monitoring and over-riding by branch staff.

As in the response times example discussed in relation to study circles, both any simplistic images of 'the paperless system', and any staff unease or lack of knowledge concerning new ideas and possibilities, were challenged in these exchanges; there were genuine opportunities to address the balance between "tradition and transcendence" in the ways discussed by Ehn (1988). In contrast with the cumbersome processes experienced by analysts and users in the City Personnel team described in Chapter Eight, here there were no intermediaries; on occasion, this caused discussions to become both heated and lengthy, but it also limited the scope for ambiguity and confusion.

A second achievement of the design team was to translate its work into a series of 'design artefacts' (Ehn, 1988) and other outputs. These can only be assessed partially here, since financial crises deferred the purchase and implementation of a system, and the detailed design activities (in conjunction with a supplier) which these would entail. The evaluation questionnaires, for example, were important 'design artefacts': the language and the presentation used reflected the different interests represented on the design team; they helped to structure and record a planned process of evaluating and selecting systems and suppliers; their content and structure also made them appropriate for use in a post-implementation evaluation process. Using the questionnaires in the context of demonstrations which still reflected systems

suppliers' standard practices proved difficult, as indicated above; nevertheless, in a modified form they enabled basic information about each system to be collected and compared.

Lastly, there is the issue of trade union involvement - one of the aspects in which the Socio-Technical design approach has been criticised. Initially, informal contact was maintained between the design team, the study circles and the trade union branch, though staff who were active in both. However, as the work of the design team became more specific, the union branch decided to establish a small group of members to monitor the proceedings, and identify areas in which links needed to be established with existing policies - for instance in connection with the existing new technology agreement. This ensured that established industrial relations procedures would not be marginalised, or overtaken, by the design team initiative. On a more positive note, it enabled the local union branch to adopt the more proactive stance - at least informally - already envisaged by a number of white-collar unions at national level (NALGO, 1988).

(ii) Weaknesses:

Like the Study Circle initiative from which it had originated, the City Libraries' design team formed part of a transition, both in terms of systems development practices and in terms of organisational structures and policies. It symbolised an attempt to make a break with

past patterns, in which both policy and 'technical' decisions had been the prerogative of particular professional or senior management groups. Its mixed membership expressed an acknowledgement of increasing interdependence between staff and management, and between professionals and non-professionals - building on the changes already initiated through the alternative grading scheme described at the beginning of this chapter.

However, it proved hard for all the parties involved to sustain this process of change. Whereas the study circles successfully established a range of activities which combined active, practical work with discussion and with producing reports, the design team found it hard to move away from 'processing documents' in the bureaucratic style characteristic of the old IT Policy Development Group. Library assistant membership on the design team was strengthened from three to seven members in 1989, but their active participation declined gradually to an average of three, as the project progressed: two members left and were not replaced; others found it increasingly hard to balance the demands of design team activities with the pressures of their ordinary work.

Like other clerical posts, the library assistant role had evolved around the provision of various support functions and services; as the studies discussed in Chapters One and Two have established, this is a model with strong gender connotations. In this kind of work, there is little or no time for reflection, for planning or for taking part in

lengthy meetings with colleagues. These activities tend to characterise professional work. But participation in systems design also requires precisely these features, among others. Opening up such participation to clerical staff thus offers genuine opportunities for personal and career development - but may not, in itself, allow the concomitant time and resources. Sustained clerical involvement, therefore, really places on the agenda the issues of clerical job design and of the inter-relations between clerical and administrative or professional posts.

If library assistants on the design team lacked time and resources to consolidate their involvement, this was partly because managers found it difficult to operate in the new ways suggested by the team structure and process. They acknowledged that library assistants needed relief staff to cover their duties, to enable them to attend meetings, but tended to underestimate what was involved in securing these resources at an adequate level. Implicitly, they saw library assistants as interchangeable; but in community branch libraries in particular, this was not the case - so that a library assistant attending a design team meeting might find herself doing this at the expense of a long-established community activity for which she was personally responsible. In other words, the implications of new City Libraries policies, in terms of equal opportunities, career development and service expansion, had not been followed through fully. This suggests that managers and senior professionals needed time, resources and

opportunities for reflecting on and questioning their previous experience and assumptions - that is, that a training or awareness process, parallel to the library assistants' study circle activities, was required, in order to create a basis for new forms of collaboration.

Over the lifetime of the project, pressures on managers - as well as on Libraries staff in general - increased, as departmental and local authority budget crises deepened. At the beginning of the project, there was an unambivalent commitment to the use of new phases of computerisation to enhance service quality and provision, rather than to reduce the workforce. By 1990, this commitment was increasingly hard for managers to sustain, even though it remained formally in place. This created inevitable tensions on the design team. One example concerned the work of the Bibliographical Services section, discussed in some depth in Chapter Seven. A new integrated system would include computerised book ordering and cataloguing facilities, potentially streamlining previously discrete and time-consuming operations. It would no longer be essential to have a separate Bibliographical Services section on the same scale as before: some cataloguing operations, for example, could be decentralised to branches or specialist reference sections. There could, therefore, be opportunities for both typists and cataloguers to move to posts offering greater diversity of skills and activities; inevitably, there were also fears that DBS staff would simply be made redundant. The senior

manager responsible for discussing the available options with DBS staff was also chairperson of the design team; she found that the two roles did not combine easily, since - for a period at least - they represented two completely opposed possibilities, one arising from the creative impetus associated with the policy developments of the early 1980s, and one from the intensifying public sector funding crises of the later 1980s.

In short, whereas the study circles made a definite break with past forms of IT-related activity in City Libraries, the design team did not achieve this degree of cultural change. By the end of the research period, gendered patterns had been challenged in some respects, but confirmed in others. For instance, library assistants were generally acknowledged as taking an active role in relation to future computerisation, and their representation in groups addressing training and job design had been consolidated. But when a 'technical' (systems) sub-group of the design team was created, in 1991, it had no women members - whether professional or nonprofessional.

9.5 Conclusion:

The period of action research described in this chapter demonstrates the potential that can exist for human-centred systems initiatives in an office work context. In this example, library assistant skills and experience were extensive; management recognition of these, in relation to

a planned integrated system, was increasing; and available systems and suppliers reflected some acknowledgement of 'user' issues. In this relatively favourable context, it was possible to establish and assess the study circles and the mixed design team as two methods which could contribute to clerical involvement in systems development, in a form in which gender issues could be addressed to some degree.

However, the case-study also illustrates a paradox, concerning systems development, user-involvement and human-centred approaches. User-involvement is increasingly important in the successful design and implementation of complex systems; but at the same time, it can also bring to the surface issues which cannot be tackled successfully within the confines of any single 'project' or set of systems development techniques. In City Libraries, clerical participation clearly strengthened the systems specification and evaluation processes, enabling potential implementation problems to be avoided. However, this participation also exposed the conflicting demands which new library policies were already placing upon the library assistant role. The day-to-day pressures to deliver a service, in a historically feminised form, were intensifying, as funding grew more restricted; at the same time, new forms of service delivery, and of systems development, required new levels of collaborative decision-making. These features had historically been excluded from the library assistant role. Over the lifetime of the research project, a

deepening crisis in public sector funding placed increasing pressures on new developments of all kinds in City Libraries, including the study circle and design team initiatives.

In the following chapter, I make some comparisons between the research discussed in this chapter and the case-studies in earlier chapters, and summarise some general observations and proposals regarding Human-Centred Systems approaches.

CHAPTER TEN:

HUMAN-CENTRED SYSTEMS - WOMEN-CENTRED SYSTEMS?

Introduction:

The starting-point for this thesis was an interest in the potential of the Human-Centred Systems research framework to address both the experience of women office workers as IT users, and the design and implementation difficulties which have been reported from a range of computer science perspectives. In this final chapter, I draw together the main themes from both the literature review and the case-studies - recognising that focussing upon the experience of women as office systems users, and upon gendered patterns in the office context, has prompted an explicit re-evaluation of this starting-point, both within this thesis and for the Human-Centred Office Systems project as a whole.

In Part One, I identified a shift in social science perspectives, away from the somewhat deterministic forecasts of the late 1970s; these tended to cast women clerical workers as passive victims or beneficiaries, rather than addressing gendered patterns in terms of both women's and men's experience, in paid work or in the household. More recently, a range of analyses have developed, focussing on the ways in which gender relations are reproduced within the workplace, in a somewhat more complex and contradictory context than that envisaged in the early labour process studies which were one of the starting-points for Human-Centred Systems research.

Recent feminist contributions to debates concerning technological change share with other social science contributions a concern to analyse the ways in which the technology-organisation boundary is defined and negotiated, rather than taking these definitions as given.

In Part Two, I discussed a range of methodologies and interdisciplinary studies concerning systems analysis and design, all of which address the issue of user-involvement. I found that while the questions of 'user relations' and of 'social factors' in systems development continue to attract increasing attention, much ambiguity and confusion remain. The prevailing lack of acknowledgement of gender or equal opportunities issues, as forming part of the social or organisational context for systems development, is one feature of a more general weakness in systems analysis and design, concerning the theorisation of power relations and of change within organisations. The growing body of interdisciplinary research on systems development represents a response to these difficulties and debates.

In this final chapter, I relate a number of key themes arising from the case-study accounts developed in Chapters Six to Nine to this broader context. In the first section of the chapter, I make two general observations concerning the context for initiatives in user-involvement, including HCS. In the second section, I summarise some observations from all the case-studies, in relation to the ways in

which gender relations are manifest in connection with office systems development. In the third section, I assess the strengths and weaknesses of the HCS approach itself, in the context of the processes described in Chapter Nine and of other new interdisciplinary research. In the fourth section, I make a number of proposals for expanding the definition and the emphasis of HCS initiatives, with reference to gender and to office work. Then in the fifth section, I conclude with a summary of the ways in which the context for HCS research, and for office workers' involvement in systems design, has altered since the Sheffield Human-Centred Office Systems Project was established in 1984.

10.1 User Involvement in Office Systems Development:

Two General Observations:

10.1.1 'Integrated Systems': Opportunities and Constraints:

In all the case-study organisations described in Chapters Six to Nine, reference was made to the kind of office systems development processes which were typical of the 1960s and early 1970s. These were intended to transfer parts of existing manual processes to large, mainframe-based systems: off-line, batch-processing operations, which commonly added to clerical effort and workload, rather than decreasing them. User-involvement was marginal at most; where the systems development and implementation processes did reveal difficulties or

dissatisfactions, there was little or no scope for users to tackle these. At East End Engineering, one such project was eventually aborted by management; at City Libraries, the layers of facilities which were created over a ten year period never operated fully as originally planned, and depended on a high degree of staff patience and ingenuity to function consistently at all.

The systems development projects of the late 1980s and early 1990s illustrate very different prospects. In all three case-study organisations, 'integrated' systems were in view: systems built around a central database, offering on-line access and communications across the organisation (and potentially to other organisations also). The mainframe basis is giving way to mini computers, as hardware costs fall and processing capacity rises.

There are, therefore, new choices; but the case-study examples in Chapters Six to Nine indicate that it is not the technology which determines how these are defined and exploited. At East End Engineering, for example, the new mini-based Procurement system underpinned the subcontracting processes through which senior management sought to survive the decline in manufacturing which took place throughout the 1980s. Communications within the organisation were streamlined; the clerical workload decreased, in some respects, although it expanded in others; senior management retained the initiative, within a highly centralised organisation.

At City Personnel, a system originally intended primarily to generate management information, and to support centralised corporate planning, was substantially redefined during the development process. This reflected the active involvement of professional user representatives to improve basic procedures in local authority personnel sections; neither senior management nor trade union representatives took a detailed interest in the project. At City Libraries, a broad-based design team drew up a systems specification with a view to retaining the systems development initiative, both in relation to systems suppliers and to the local authority central computer services division. Here the aims were to support a decentralisation of decision-making, and a programme of improvements both in public service provision and in staff working conditions.

The scope of the systems development process has changed as much as the actual or intended products. Bearing out the research discussed in Chapters Three and Four, there was a clear concern with user-involvement in all three organisations. At East End Engineering, the system was developed 'in-house', using a prototyping approach to facilitate close collaboration between a key clerical systems user and a senior IT manager. However, in the office context it is becoming more common to purchase and adapt software products than to design them in-house; both for City Personnel and for City Libraries, this was considered the only viable financial option. But systems

on this scale offer a great deal of potential for negotiation and design, both of software features and of working practices. ICL's 'Personnel 29', for instance, included facilities for screen design; the adoption of a Structured design methodology - on the supplier's advice - obscured this prototyping potential, although it did not prevent professional personnel staff on the project team from insisting on significant additions and changes to the system structure. At City Libraries, the detailed systems specification deliberately linked job design and systems design issues, for instance by building in facilities for local branch staff to access and amend some centralised procedures.

In two respects, then, the case-studies illustrate the fact that there is particular scope for user-involvement in relation to new integrated systems of the kind described above. Firstly, in contrast with earlier batch-processing systems, they do not simply replicate existing operations, but facilitate change and reorganisation (as anticipated by West, 1982, quoted in the Introduction). From the perspective of women clerical workers, there are both threats and opportunities here: some office operations may decrease or disappear (as happened in different ways both at East End Engineering and at City Libraries), but this can create scope for new developments; it can facilitate job losses, but (as at East End Engineering and City Libraries) does not always do so, even when this is a management objective.

The case-studies also emphasise that these complex systems cannot be designed or installed by computing personnel working in isolation. New levels of collaboration are required, between designers and 'users', and between different groups of 'users'. In this sense, the case-studies confirm the observations made during the 1980s by researchers such as Kubicek (1983), Hirschheim (1985) and Friedman and Cornford (1989). These earlier studies, however, did not seek to examine how far gender relations might play a part in shaping opportunities for, or patterns of, user-involvement in office systems design. I turn to a specific discussion of this theme in section 10.2 below.

10.1.2 Systems Development Methodologies:

Social and Economic Context:

During the period in which the projects described in Chapters Six to Nine took place - the second half of the 1980s - both the private and the public sector were undergoing major processes of restructuring. At East End Engineering, a context of manufacturing decline contributed to management's perceived need for a new Procurement system; it also delayed the project, by limiting the human and financial resources available to support it. At City Personnel, the legal and political context altered radically over the lifetime of the systems development project. The prospect of compulsory competitive tendering for local authority services

encouraged Computer Services staff to cultivate better relationships with systems users, contributing to a climate for strong professional user-involvement in design. But changes in internal budgeting - related to cutbacks in local government spending - threatened to undermine the fundamental purpose of the system as an authority-wide facility. At City Libraries, as at East End, management considered a new computerised system essential to survival in a climate of financial constraints; however, here too the same constraints delayed the actual acquisition of a system, in this case by over two years.

The point of making these general observations is to introduce a note of caution, concerning assessment of the effectiveness of any systems development methodology. There are relevant factors both within and beyond the organisation in which any particular systems development project takes place. At City Personnel, the Structured methodology itself did impede progress in many respects: although it facilitated user-designer communications in the early stages, the inflexibility of the 'life-cycle' model made the design of systems features and screen displays a cumbersome process. The choice of methodology was not responsible for the effects of local authority reorganisation and financial cutbacks - but it did exacerbate the project's vulnerability to these. In the other two organisations, in contrast, external factors imposed severe constraints upon systems development approaches which had the capacity to involve a range of

users in a flexible and effective design process. That is, in any particular situation there needs to be an assessment of the interactions between organisational processes or structures (management styles; trade union policy; computing approaches; clerical job design and career structure), and larger-scale ones (trends in the local or national labour-market; government legislation; innovations by systems suppliers). The research agenda suggested by Land et al (1983) still stands, therefore, since there have been very few detailed accounts of systems development processes in these terms. (Murray and Woolgar, 1990, and Murray and Woolgar [Eds] forthcoming illustrate emerging approaches in this area).

10.2 Gender and Office Systems Development Processes:

My aim here is to contribute to these emerging analyses by summarising the ways in which gender relations played a part in the office systems development initiatives described in Chapters Six to Nine. These case-studies suggest four main observations, with which I will deal in turn in this section:

- (i) Pre-existing patterns of gender inequalities are manifest in some respects, in the office systems development process; the scope available to women clerical users to participate, in particular, is shaped and limited by gender-related expectations of clerical roles;
- (ii) The processes of planning and developing integrated

office systems also exposes a number of tensions, unresolved issues and opportunities for intervention, in connection with gender inequalities within organisations;

(iii) Gender associations can (but do not always) play a strong part in the ways in which new IT systems are perceived and used, both by men and by women;

(iv) An examination of the ways in which gender issues are manifest, in relation to office systems development, illustrates a more fundamental paradox or difficulty, concerning information systems development processes and methodologies.

10.2.1 Observing Pre-Existing Patterns of Gender Inequality during Office Systems Development:

Both at East End Engineering and at City Libraries, there were senior managers who perceived clerical user-involvement in systems development as crucial to its success (even though this perception was not shared by other senior or middle managers).

This perception was expressed in their concern to see distinct areas of clerical knowledge represented in systems design: the timing and location of day-to-day office procedures; the organisation of paper and computerised records; the formal and informal aspects of clerical/administrative exchanges of information. It was also expressed in a concern to ensure that specific skills associated with clerical posts could be deployed in connection with systems specification, design, testing and implementation activities: mediation with a range of

clerical and professional colleagues, informal training and problem-solving, for example, at East End Engineering; liaison with colleagues and with members of the public at City Libraries. At City Personnel, there was some recognition of clerical contributions in terms of knowledge of basic procedures, during systems analysis; the fact that it was not possible to observe systems implementation makes it impossible to assess how far clerical mediation or communications skills might have become important at later stages of the process.

These forms of clerical knowledge and skill are familiar from studies such as Davies and Rosser's observation of the 'Female Office Management Function' (1985), from Crompton and Jones' observation of the role of clerical cooperation in relation to computerisation (1984) and from the Scandinavian research discussed in Chapter Four. This kind of support and servicing contribution repeats, in the new context of systems development, the often unacknowledged role played by women clerical workers in administrative and organisational operations. The example of East End Engineering, in particular, illustrated how an entrenched gender division of labour inside the company (combined with a lack of employment options in the external labour market) helped to ensure that clerical workers whose role and responsibilities were expanding, in relation to IT, were not able to gain formal recognition for this. Intentionally or unintentionally, managers and male colleagues were able to treat it as part of a broader clerical support function, rather than something with

'technical' connotations. Gender-related forms of control - formal and informal - were still in evidence, rather than having been displaced by increasing use of IT in the way envisaged for instance by Barker and Downing (1980).

10.2.2 Tensions, Issues and Opportunities, in Connection with Gender and with the Development of Integrated Office Systems:

However, the experience of taking part in the planning and development of new integrated systems did appear to expose a number of tensions and new possibilities, in relation to the scope of clerical posts and the boundary between these and administrative, professional and managerial roles. At East End Engineering, departmental managers expressed ambivalence about clerical involvement in systems design; this contributed to a degree of internal management friction, in a context where 'direct control' and 'responsible autonomy' management styles coexisted uneasily. The key clerical worker concerned wanted to consolidate her involvement by learning to do computer programming, and by taking part in other systems development projects. In opposing ways, both she and her managers acknowledged the possibility of building on a 'natural career path' from office work to computing, in the way suggested by the Women Into Technology campaign (1988) in a business-oriented context, and by Hales (1988) in the context of local government economic strategies.

At City Libraries, in contrast, clerical participation

received more explicit and substantial recognition, both because of formal equal opportunities initiatives, and because of management's perceived dependence on staff support and cooperation. A desire to increase the flexibility of service provision had combined with commitments to equal opportunities measures, to begin expanding clerical roles, and library assistant participation in systems development appeared to be a natural extension of this.

However, sustained clerical user participation began to expose the limits of City Libraries' new policies on service provision and on equal opportunities policies, in two important respects. Firstly, it became clear that the structure of library assistant jobs - based on historically feminised patterns of service provision and clerical support functions - could not easily accommodate the time and effort required to carry out in-depth systems development work. Therefore, sustaining clerical involvement - to which all parties were committed - suggested the need to bring about more radical changes in clerical job design and career structure than had been envisaged in the library assistants' 'alternative grading scheme'.

Secondly, as in most conventional contexts, equal opportunities measures aimed at women in low-paid posts had not been accompanied by efforts to prompt increased managerial and professional awareness. Management and senior professional Design Team members, for instance,

found themselves trying to build a basis for new forms of collaboration with women clerical workers, but with few means through which to equip themselves for the changes required, in attitudes and in practices. As at East End Engineering, the most marked resistance or ambivalence, concerning clerical involvement, emerged at middle-management rather than senior management level.

10.2.3 Gendered Perceptions of Information Technology:

In different ways, all three case-studies illustrated the ways in which new information systems themselves are perceived within, or assimilated into, contexts which include strong patterns of gender difference and inequality. At East End Engineering, male professionals compared the new Procurement system to 'a massive filing-system': for them, it appeared to have taken on the attributes they associated with the clerical workers whose 'province' it had become - static, and non-strategic. These perceptions were in marked contrast with those of senior management and of women clerical workers, both of whom associated the new system with major changes in the company's internal structure, and its relationship with client and supplier companies. Gender-related perceptions of the system had contributed to restricting its day-to-day use by male professionals - illustrating a gender dimension in the ways in which information systems interact with patterns of work organisation and social relations.

At City Personnel, prevailing assumptions about data entry

- another feminised aspect of clerical work, commonly seen as essential but also as routine and unproblematic - allowed a major system cost, and job design issue, to go undiscussed. The proposed new system was seen as addressing gender issues in terms of its ability to store equal opportunities data; but the job design implications - overlooked within the same Central Personnel department which had been responsible for devising a Clerical Workers' Development Programme - had the potential to undermine equal opportunities measures inside the organisation itself.

At City Libraries, women library assistants and their professional colleagues used many of the same computerised facilities; however, these took on connotations of 'operator' status, and of impersonality, for the former - while for the latter, they were associated with opportunities to learn and to experiment.

10.2.4 Office Systems Development: a Paradox:

Returning to one of the general points made earlier in this chapter, the generation of 'integrated office system' projects illustrated in the case-study chapters clearly offer a number of opportunities for change in patterns of work organisation, career development and job design. An 'opportunity to rethink manual procedures', as well as designing computerised ones, was acknowledged, to differing degrees, in all three organisations.

However, such opportunities also exposed unresolved internal differences and difficulties. At East End Engineering, they made visible the tension between conflicting management styles; at City Personnel, a lack of senior management vision and awareness, with respect to IT, was evident; at City Libraries, they highlighted tensions and ambiguities concerning changes in the boundary between clerical and professional library posts. Issues of this order require responses which are not within the scope of conventional systems development methodologies and techniques; they are reminiscent of the issues of 'structural change' referred to by Checkland, in relation to Soft Systems approaches, but not satisfactorily resolved (as discussed in Chapter Three).

This emphasises the importance of broadening the terms of interdisciplinary research in connection with systems development, to encompass more sensitive analyses of power relations within and between organisations. In the following section, I illustrate this point, and in section 10.4 I make a number of proposals concerning the emphasis and the scope of the Human-Centred Systems approach itself.

10.3 Human-Centred Systems: Strengths and Limitations:

In the Introduction, I noted that Human-Centred Systems research - particularly in the UK - had implicitly emphasised craft and trade union traditions, and models of skill, associated with men's rather than women's employment.. Evidence of the ways in which gender

divisions endure and are reproduced within the workplace, as well as within the labour market, suggests that women workers (whether in offices or in manufacturing) cannot simply be 'slotted into' initiatives of the kind described by Cooley, (1987), Rosenbrock (1989) or Ehn (1988). Critiques of labour process theory and of systems development methodologies in computer science, from a gender perspective, help to explain why women workers have not been a prominent focus for Human-Centred Systems research to date: their skills and experience, in relation to technology, have received little recognition in these contexts. Observations arising both from the 'action research' experience described in Chapter Nine, and from other research which has taken place over the same period as this, help to elaborate these critiques, and to suggest a number of positive proposals.

(i) Case-study observations:

The issues of power relations and inequalities within organisations, referred to above, were not resolved in the action research described in Chapter Nine. They were, however, articulated in a way that helps to illustrate both the strengths and the limitations of intervention in processes of systems development from a gender perspective.

Firstly, it is important to note the ways in which the vision or strategy of 'human-centred technology' readily

became a focus for an alliance of quite diverse interests. When the project began, the key participants, within the organisation, were a woman Director committed both to equal opportunities and to improving the quality of library services, and a group of women clerical workers who were concerned about the inadequacies of current (and proposed) forms of IT use. The HCOSP research team shared with City Libraries' own research officer the role of inviting both parties to interpret the 'human-centred' emphasis in their own context. Interest on the part of professional librarians, middle managers and trade union representatives was muted, although there was no overt hostility.

By the time the research aspect of the project came to an end, an alliance was still in place, although its composition had altered. On the positive side, trade union interest had become active, ensuring that the difficulties noted in relation to Socio-Technical systems approaches - the marginalisation of established industrial relations procedures - would not occur. On the part of the NALGO branch, this represented a move towards a more 'proactive' policy on IT, rather than one limited to safeguarding the status quo (Williams, 1987; NALGO, 1988). This provided some a new level of support for library assistants, in their concerns with job design, training and career opportunities, and established a new link between equal opportunity and IT concerns. Middle managers and professional librarians were also more centrally involved; their detailed work with library

assistants, through the design team, facilitated a dialogue over service provision and working practices which had tended to take place only within branches or sections, rather than between them, previously.

Two points are important here: firstly, there was no single 'champion' or leading party, in the project; its strengths appeared to lie in the establishment of a flexible alliance of interests. Secondly, the emphasis was as much on defining new forms of organisational 'process' as on specifying 'product' or system attributes. This was a positive achievement, in the sense that it allowed an examination of possibilities and approaches in a 'real' organisational context rather than in the unique circumstances of a project such as UTOPIA in Sweden. Less positively, the local authority budget crises which delayed the acquisition of a new system in City Libraries' prevented the research project from being able to examine to what extent the priorities expressed, for instance, in the systems specification would be embodied in implementation and use. However, both the fact that achievements arose from a basis of the alliance of differing interests, and that they focussed on issues of 'process' as much as 'product', suggests a redefinition of previous forms of Human-Centred Systems approach.

The most visible weakness in the project, however, concerned the issue of managerial practices, in connection with user-involvement and with Human-Centred approaches in particular.

The Study Circle initiative achieved its immediate objectives: a new basis was created on which women library assistants could contribute to systems planning and development processes, and the terms of debate concerning IT were broadened to include gender and other organisational issues. But directing resources to those with least status and power within the organisation, through the study circles - in the spirit of the Human-Centred emphasis on power relations between management and labour - was not sufficient to consolidate these achievements. The difficulties and the friction experienced within the Design Team indicated that managers and professional staff had an equally strong need to reassess their perceptions of information technology. To some degree, these reassessments were prompted by exchanges between Design Team members - but this placed a great deal of pressure on library assistants, for instance when their observations clashed with those of line managers. These pressures were increased after the departure of the woman Director whose support for library assistant involvement had been central in initiating the project. This suggests a need to examine how forms of management training, for instance, might be developed to address issues of gender, IT and organisational change.

(ii) Recent, Related Research:

In a recent paper, Mike Hales has observed the ways in which Human-Centred Systems initiatives are becoming increasingly associated with large, EC-funded projects,

and to some extent with networks of academics rather than with the labour movement and local authority networks in which they first emerged (Hales, 1992). He finds HCS "a very long way from home" in the corridors of power in Brussels, and suggests that a "*politics of obviousness*" - implying a unified, progressive human 'subject' - underlies the limited achievements of past HCS initiatives, and exists in some tension with the challenges represented by gender analyses.

Other research carried out during the late 1980s has also emphasised how far the context for HCS, and for other similar initiatives, has changed. Rather than suggesting that a single 'best way' might be developed, in pursuit of human-centred systems, many new interdisciplinary projects now provide a basis for extensive exchange and debate. These range from work in progress, with systems users in professional work, to develop 'computer-supported cooperative work' (CSCW), to analyses of the hidden or informal design activities undertaken by office workers (Greenbaum and Kyng, 1991; Clement, 1991).

In the following section, I propose a redefinition of aims and practices in relation to HCS. This is intended to reflect an emphasis on articulating possibilities, rather than on prescribing solutions.

10.4 HCS Strategies and Gender Relations: Some Proposals:

104.1 Defining the Aims:

- (i) To prompt critical debate, and new practices, concerning the design and use of office information technologies;
- (ii) To support the articulation and negotiation of different interests and perspectives, within organisations, concerning information technology;
- (iii) To identify opportunities for intervention and change, in connection with the patterns of gender inequality which are currently associated with information technology design and use;
- (iv) To develop innovative practices in the design of systems and of working practices.

10.4.2 General Principles:

I recognise the severe limitations of the ways in which legislation, policy and political debate have all been framed with reference to 'equal opportunities'. However, equal opportunities structures now exist in many organisations; in some instances, they coexist with other kinds of initiative on gender. So I suggest that both can form a point of departure for challenging the conventional boundaries between strategies on IT and those on other aspects of policy development. Therefore:

- (i) At an organisational level, both Equal Opportunities strategies [or related initiatives on gender and other inequalities] and IT strategies should be strengthened by

the establishment of links and cross-references, broadening their scope.

(ii) These interconnections should be established, firstly, by ensuring that policy groups or committees in each area each include at least one person responsible for liaison with the other; secondly, by ensuring that policy documents and proposals address areas of common interest such as training and job design, in which joint proposals can be developed.

10.4.3 Methods and techniques:

The study circle and design team initiatives described in Chapter Nine do not supercede existing methods in systems development - such as prototyping - which have been identified, in earlier chapters, as offering opportunities for user-involvement. They do, however, provide a response to the problems identified in Chapters Two and Three, concerning the creation of a strong basis on which women clerical workers can collaborate with designers, and with other systems users. In that sense they can be described as relevant elements within a human-centred methodology which would also encompass techniques such as prototyping.

Study Circles are particularly relevant to the processes of identifying problems and opportunities associated with office systems development, and of encouraging user-involvement on a broad basis.

They should take place in work time; should not include more than ten participants, of a broadly similar status;

and should have the resources both to assess examples of office systems in use, and to examine existing practice within the organisation. Study circles need a facilitator, rather than a leader or trainer; this does not have to be someone with computing expertise, or someone outside the organisation.

Study circle groups should also have the scope to report their observations to senior management, to trade union representatives, and to other relevant policy bodies in the organisation (such as an Equal Opportunities or IT committee).

A Design Team structure should include representation from every level within the organisation; clerical representation should not be less than one third. Clear lines of communication with management and trade union bodies are essential, as is a clearly-defined convenor or chairperson. The 'brief' of the team should be to address 'systems development' in a broad sense - that is, to identify issues of policy and of organisational change, as well as identifying IT possibilities.

A Range of Techniques are appropriate, to support the work of study circles and design teams; these need to include - but are not restricted to - the following:

(i) Techniques for visualising new possibilities, in connection with IT: paper-based mock-ups; computer-based mock-ups and prototypes; practical assessments of systems in use; systems demonstrations;

- (ii) Techniques for specifying the design both of software and of working practices: formal specification documents; samples of screen designs (on paper and computer-based); model job descriptions;
- (iii) Techniques for evaluating systems, and working practices, both before changes are planned and after implementation: questionnaires, interviews and informal group discussion.

10.5 Conclusion:

The Context and Prospects for HCS in the 1990s:

In this chapter, I have suggested that gender relations remain an important feature of office management and working practices, in connection with IT, in contrast with some of the early expectations expressed by social scientists. My own case-study research has illustrated a number of opportunities and constraints, in relation to the current generation of 'integrated' IT systems. Their successful development depends on close collaboration between managers, designers and a range of 'users'; however, pre-existing patterns of gender inequality both structure women clerical workers' opportunities, in this context, and emerge as potential sources of tension and ambiguity.

Human-Centred Systems initiatives have generated powerful critiques of existing uses of technology, as well as new prototype systems and products. In a sense, then, HCS

sought to show that technology could indeed be 'socially shaped', to embody 'human' values broader than those of professional technologists, and opposed to those of the dominant multinational companies. But paradoxically, while challenging some of the taken for granted aspects of 'technology', HCS tended to take 'human' as read. 'Human' was male, on the whole; typically a skilled printer or engineer. 'Human' was also treated as unproblematic in a more fundamental sense, as an implicitly homogenous subject - leaving little scope to take up issues of identity, difference, or conflict within or between workforces and communities. (Hales, 1992).

The HCS tradition, then, has not been one which could simply encompass the concerns and the experiences of women clerical workers in a new set of techniques or prototypes; as in other areas of social theory and practice, consideration of gender relations prompts a reconsideration of the terms and the boundaries of debate, not only an attempt to involve different participants or a broader agenda. At the same time, research on gender and technology increasingly emphasises the need to develop strategies for intervention in processes of design as well as of use - not only in order to expose and challenge inequalities, but also to develop and evaluate new practices. In this context, interdisciplinary initiatives in systems development - including HCS - represent an increasingly important area.

The original aim of Human-Centred Systems research was very much to embody values of collectivity and solidarity, in new designs of working practices and of technologies. If that impetus is to survive the 1990s - a decade in which these values have become 'contested terrain' at every level from the household to the nation-state - it will need to do so in many different incarnations.

BIBLIOGRAPHY

- Anderson, R.J. and Sharrock, W. (1990)
'What the Work Comes to: problems in the vernacular formulation of the software development lifecycle'.
Paper presented to the ESRC/PICT Software Workshop, Oxford, 19-20 July.
- APEX (1985)
'Job Design'
(trade union education booklet).
- Ashworth, P. (1987)
'Adequacy of Description - the Validity of Qualitative Findings'.
Paper presented to the Workshop on Qualitative Research in the Human Sciences, Sheffield City Polytechnic, 12th May 1986.
- Avison, D.E. and Wood-Harper, A.T. (1986)
'Multiview - an Exploration of Information Systems Development', The Australian Computer Journal, vol. 18, no. 4, November 1986.
- Avison, D.E. and Fitzgerald, G. (1988)
Information Systems Development: Methodologies, Techniques and Tools.
Oxford: Blackwell.
- Barker, J. and H. Downing (1980)
'Word processing and the Transformation of Patriarchal Relations of Control in the Office'.
in Capital and Class no 10.
- Barnes, B. and D. Edge (eds) (1982)
Science in Context: Readings in the Sociology of Science,
Milton Keynes: Open University Press.
- Beech, C. (1991)
'Women and WIT'
in Eriksson et al (eds) Women, Work and Computerization: Understanding and Overcoming Bias in Work and Education.
Amsterdam: North-Holland.
- Beechey, V. (1987)
Unequal Work
London: Verso.
- Bell, D. (1973)
The Coming of Post-Industrial Society.
New York: Collier-Macmillan.
- Bell, D., Murray, F., Pain, D. and Rahtz, N. (1985)
'What are the possibilities for human-centred system development in Britain?' Paper presented to the Conference on the Development and Use of Computer Based Systems and Tools, Aarhus, August 1985.

- Benston, M. Lowe (1988)
 'Women's Voices, Men's Voices: Technology as Language', in
 C. Kramarae (ed) *Technology and Women's Voices: Keeping in
 Touch*.
 New York: RKP.
- Beynon, H. (1975)
Working for Ford
 Harmondsworth: Allen Lane.
- Bhaskar, Roy (1979)
 'On the Possibility of Social Scientific Knowledge and the
 Limits of Naturalism' in J. Mepham and D. Ruben (eds)
Issues in Marxist Philosophy, Vol. 3.
- Bijker, W. T. Hughes and T. Pinch (eds) (1987)
The Social Construction of Technological Systems
 Cambridge, Mass MIT Press.
- Bird, E. (1980)
*Information Technology in the Office: The Impact on
 Women's Jobs*
 Manchester: EOC.
- Bjerknes, Gro, Pelle Ehn and Morten Kyng (eds) (1987)
Computers and Democracy - A Scandinavian Challenge
 Aldershot, England: Avebury.
- Bjorn-Andersen, N. (1986)
 'Modelling the Nature of the Office for Design of Third
 Wave Office Systems': Paper to the ESPRIT Workshop,
 17-19 August, 1986, Denmark.
- Bjorn-Andersen, N. (1988)
 'Are "Human Factors" Human?', The Computer Journal, Vol.
 31, No. 5, 1988.
- Blackburn, R.M. and M. Mann ((1979)
The Working-Class in the Labour Market,
 London: Macmillan
- Blauner, R. (1964)
Alienation and Freedom,
 University of Chicago Press.
- Blumer, H. (1969)
Syumbolic Interactionism: Perspective and Method,
 Prentice-Hall.
- Bodker, Susanne and Joan Greenbaum (1988)
*A Non-Trivial Pursuit - Systems Development as
 Cooperation: a Report of the ROSA Project*
 Computer Science Department, Aarhus University, Denmark.
- Boland, R.J. and Hirschheim, R.A. (eds) (1987)
Critical Issues in Information Systems Research.
 Chichester: Wiley.

Bowles, G. and R. Duelli-Klein (1983)
Theories of Women's Studies,
London: RKP.

Braverman, H. (1974)
Labour and Monopoly Capital,
New York: Monthly Review.

Briefs, U., Schneider, L. and Ciborra, C. (eds) (1983)
Systems Design For, With and By the Users,
Amsterdam: North-Holland.

Burawoy, M. (1979)
Manufacturing Consent: Changes in the Labor Process under Monopoly Capitalism,
Chicago: Chicago University Press.

Burrell, G. and G. Morgan (1979)
Sociological Paradigms and Organisational Analysis
London: Heinemann.

Burns, T. and Stalker, G.M. (1961)
The Management of Innovation.
London: Tavistock.

Cain, M. (1986)
'Realism, Feminism, Methodology and Law'
in *International Journal of the Sociology of Law*, 14
London: Academic Press.

Cain, M. (1987)
'Realist Philosophy, Social Policy and Feminism:
on the Reclamation of Value-full Knowledge'.
Paper presented to the BSA Conference on Science
Technology and Society, Leeds University, April 1987.

Cain, M. and J. Finch (1982)
'Towards a Rehabilitation of Data', in
P. Abrams (ed) *Practice and Progress: British Sociology 1959 - 1980*
London: Allen and Unwin.

Callon, M. (1986)
'The Sociology of an Actor-Network' in M. Callon, J. Law
and A. Rip (eds) Mapping the Dynamics of Science and Technology.
London: Macmillan.

Checkland, P. (1981)
Systems Thinking, Systems Practice,
London: Wiley.

Checkland, P. and Scholes, R. (1990)
Soft Systems Methodology in Action.
Chichester: Wiley.

- Cockburn, C. (1983)
Brothers: Male Dominance and Technological Change,
 London: Pluto Press.
- Cockburn, C. (1985)
Machinery of Dominance: Women, Men and Technical Know-How,
 London: Pluto.
- Cockburn, C. (1986)
 'The Relations of Technology: What Implications for
 Theories of Sex and Class?' in R. Crompton and M. Mann
 (eds) *Gender and Stratification*
 Cambridge: Polity Press.
- Cockburn, C. (1990)
 'Technical Competence, Gender Identity and Women's
 Autonomy', paper presented to the World Congress of
 Sociology, Madrid, 9-13 July 1990.
- Collective Design/Projects (eds) 1985
*Very Nice Work If You Can Get It - The Socially Useful
 Production Debate*,
 Nottingham: Spokesman.
- Cooley, M. (1980)
Architect or Bee,
 Slough: Langley Technical Services.
 (Revised version published in 1987).
- Cooley, M. (1985)
 'After the Lucas Plan'
 in Collective Design/Projects (eds) *Very Nice Work if You
 Can Get It - The Socially Useful Production Debate*.
- Coombs, R. and Cooper, D. (1991)
 'Accounting for Patients? Information Technology and the
 Implementation of the NHS White Paper'. PICT Policy Paper
 No. 10, Economic and Social Research Council.
- Cowan, R. Schwartz (1983)
*More Work for Mother: the Ironies of Household Technology
 From the Open Hearth to the Microwave*,
 New York: Basic Books.
- Cowie, A. (1988)
 'Screen Prejudice', article in The Guardian, 25 February
 1988.
- Craib, I. (1989)
Psychoanalysis and Social Theory: the Limits of Sociology,
 Hemel Hempstead: Harvester Wheatsheaf.
- Crompton, R. and G. Jones (1984)
*White-Collar Proletariat: Deskillling and Gender
 in Clerical Work*,
 London: Macmillan.

- Crompton, R. and S. Reid (1982)
 'The Deskilling of Clerical Work'
 in S. Wood (ed) *The Degradation of Work? Skill, Deskilling and the Labour Process*.
- Curran, S. and H. Mitchell (1982)
Office Automation - an Essential Management Strategy
 London: Macmillan.
- Dain, J. (1988)
 'Getting Women into Computing', University Computing 10,
 pp 154-157.
- Davidson, M. and Cooper, C. (1987)
Women and Information Technology.
 Chichester: Wiley.
- Davies, C. and Rosser, J. (1986)
 'Gendered Jobs in the Health Service: a Problem for Labour Process Analysis', in D. Knights and H. Willmott (eds)
Gender and the Labour Process.
 Aldershot: Gower.
- DeMarco, T. (1979)
Structured Systems Analysis and Systems Specification,
 Englewood Cliffs, NJ:Prentice-Hall.
- Denzin, N.C. (ed) (1970)
Sociological Methods: a Source Book,
 London: Butterworth.
- Dex, S. (1985)
The Sexual Division of Work,
 Brighton: Harvester.
- Docherty, P., Fuchs-Kittowski, K., Kolm, P. and
 Matthiassen, L. (1987)
Systems Design for Human Development and Productivity: Participation and Beyond.
 Amsterdam: North-Holland.
- Easlea, B. (1973)
Liberation and the Aims of Science
 Chatto and Windus for Sussex University Press.
- Easlea, B. (1981)
Science and Sexual Oppression: Patriarch's Confrontation with Woman and Nature,
 London: Weidenfield and Nicholson.
- Easlea, B. (1983)
Fathering the Unthinkable: Masculinity, Scientists and the Nuclear Arms Race,
 London: Pluto Press.

- Edwards, R. (1979)
Contested Terrain: The Transformation of the Workplace in the Twentieth Century
 London: Heinemann.
- Ehn, P. (1988)
Work-Oriented Design of Computer Artefacts
 Stockholm: Arbetslivscentrum.
- Ehn, P. and M. Kyng (1987)
 'The Collective Resource Approach to Systems Design' in Bjerknes, G. et al *Computers and Democracy - A Scandinavian Challenge*.
- Elger, T. (1982)
 'Braverman, Capital Accumulation and Deskillling' in Wood, S. (ed) *The Degradation of Work? Skill, Deskillling and the Labour Process*.
- Epstein, C. Fuchs (1988)
Deceptive Distinctions: Sex, Gender and the Social Order.
 New Haven, Connecticut: Yale University Press.
- Eriksson, I.V. B.A. Kitchenham and K.G. Tijdens (eds) (1991)
Women, Work and Computerization: Understanding and Overcoming Bias in Work and Education
 Amsterdam: Elsevier/North-Holland.
- Farrar, A. (1985)
 'War: Machining Male Desire' in Patton, P. and Poole, R. (eds) *War/Masculinity*.
 Sydney: Intervention Publications.
- Faulkner, W. and E. Arnold (eds) (1985)
Smothered by Invention: Technology in Women's Lives,
 London: Pluto Press.
- Finch, J. and Groves, D. (eds) (1983)
A Labour of Love: Women, Work and Caring.
 London: RKP.
- Fleck, J., Webster, J. and Williams, R. (1989)
 'The Dynamics of IT Implementation: a Reassessment of Paradigms and Trajectories of Development', paper presented to the PICT Network meeting, Brunel University, 17-19 May 1989.
- Fox Keller, E. (1985)
Reflections on Gender and Science
 New Haven, CT: Yale University Press.
- Fox Keller, E. (1983)
A Feeling for the Organism: The Life and Work of Barbara McClintock
 San Francisco, California: Freeman.

- Friedman, A. L. (1977)
Industry and Labour: Class Struggle at Work and Monopoly Capitalism,
 London: Macmillan.
- Friedman, A.L. and Greenbaum, J. (1984)
 'Wanted: Renaissance People', Datamation
 1 September, 134-144.
- Friedman, A. L. and Cornford, D.S. (1987)
 'Strategies for meeting user demands: an international perspective', International Journal of Information Management, 7, 3-20.
- Friedman, A. L. with Cornford, D.S. (1989)
Computer Systems Development: History, Organisation and Implementation,
 London: Wiley.
- Galtung, J. (1967)
Theory and Methods of Social Research.
 London: Allen and Unwin.
- Game, A. and R. Pringle (1984)
Gender at Work
 Sydney: Allen and Unwin.
- Gaskell, J. (1986)
 'Conceptions of Skill and the Work of Women: Some Historical and Political Issues', in Hamilton, R. and Barrett, M. (eds) *The Politics of Diversity*.
 London: Verso.
- Giddens, A. (1982)
Sociology: A Brief but Critical Introduction.
 London: Macmillan.
- Giddens, A. (1984)
The Constitution of Society
 Berkeley, California: University of California Press.
- Gill, K.S. (1990)
Summary of Human-Centred Systems Research in Europe,
 Seake Centre, Brighton Polytechnic.
- Gill, K.S. (1986)
 'The Knowledge Based Machine: Issues of Knowledge Transfer' in *Artificial Intelligence for Society*,
 Chichester: Wiley.
- Glenn, E.K. and R.L. Feldberg (1979)
 'Proletarianising Clerical Work: Technology and Organisational Control in the Office'
 in Zimbalist, A. (ed) *Case Studies on the Labor Process*

- Goodman, S. and Perby, M-L (1985)
'Computerisation and the Skill in Women's Work', in A. Olerup, E. Schneider and E. Monod (eds) Women, Work and Computerisation: Opportunities and Disadvantages,
 Amsterdam: North-Holland.
- Goranzon, B. et al (1982)
Job Design and Automation
 Arbetslivscentrum, Sweden.
- Gramsci, A. (1971)
Selections from the Prison Notebooks.
 London: Lawrence and Wishart.
- Green, E., Owen, J. and Pain, D. (1993)
Gendered By Design? Information Technology and Office Systems.
 London: Taylor and Francis.
- Greenbaum, J. (1987)
The Head and the Heart - Using Gender Analysis to Study the Social Construction of Computer Systems
in Computers and Society, 20 (2), June 1990
- Greenbaum, J. and M. Kyng (eds) (1991)
Design at Work - Cooperative Design of Computer Systems
 Hillsdale, NJ: Lawrence Erlbaum Associates.
- Gronfeldt and Kandrup, (1985)
'Still Dancing After All These Years?' in Olerup et al (eds), Women, Work and Computerization.
 Amsterdam: North-Holland.
- Hacker, S. (1989)
Pleasure, Power and Technology - Some Tales of Gender, Engineering and the Cooperative Workplace
 London: Unwin Hyman.
- Haddon, L. (1988)
'The Roots and Early History of the British Home Computer Market: Origins of the Masculine Micro', PhD thesis,
 Management School, Imperial College, University of London.
- Hales, M. (1988)
Women - the Key to Information Technology
 Report produced for the London Strategic Policy Unit.
- Hales, M. (1992)
'What has Gender to do with Human-Centred Design?'
 Paper for the CIRCIT seminar series, Gender, Work and Technology, Melbourne Australia, August.
- Haraway, D. (1991)
Simians, Cyborgs and Women - The Reinvention of Nature,
 London: Free Association Books.

- Harding, S. (1986)
The Science Question in Feminism
 Milton Keynes: Open University Press.
- Harding, S. (ed) (1987)
Feminism and Methodology.
 Milton Keynes: Open University Press.
- Hartmann, H. (1981)
 'The Unhappy Marriage of Marxism and Feminism:
 Towards a More Progressive Union' in Lydia Sargent (ed)
Women and Revolution: the Unhappy Marriage of Marxism and Feminism.
 London: Pluto Press.
- Hartsock, N. (1983)
 'The Feminist Standpoint: Developing the Ground for a
 Specifically Feminist Historical Materialism', in
 S. Harding and M. Hintikka (eds) *Discovering Reality:
 Feminist Perspectives on Epistemology, Metaphysics,
 Methodology and the Philosophy of Science*.
 Dordrecht:Reidel.
- Henwood, F. (1991)
*Gender and Occupation: Discourses on Gender, Work and
 Equal Opportunities in a College of Technology*.
 Unpublished Ph.D. thesis, University of Sussex.
- Henwood, F. (1993)
 'Establishing Gender Perspectives on Information
 Technology: Problems, Issues and Opportunities', in E.
 Green, J. Owen and D. Pain (eds) *Gendered By Design?
 Information Technology and Office Systems*.
 London: Taylor and Francis.
- Hill, (1981)
The Tragedy of Technology.
 London: Pluto Press.
- Hirschheim, R. (1985)
Office Automation: Concepts, Technologies and Issues.
 Wokingham: Addison-Wesley.
- Hirschheim, R. A. (1987)
 'User Participation in Practice', Paper to the Conference
 on Participation in Systems Design, London Business
 School, April 1987.
- Hornby, P., Clegg, C.W., Robson, J.I., Maclaren, C.R.R.,
 Richardson, S.C.S., and O'Brien, P. (1991),
 'Human and Organisational Issues in Information Systems
 Development', working paper, MRC/ESRC Social and Applied
 Psychology Unit, Department of Psychology, University of
 Sheffield.

- Huws, U. (1982)
Your Job in the Eighties: A Woman's Guide to New Technology
 London: Pluto Press.
- Jackson, M. (1982)
 'The Nature of 'Soft Systems' Thinking: the Work of Churchman, Ackoff and Checkland', Journal of Applied Systems Analysis, vol. 9.
- Jackson, M. (1985)
 'Social Systems Theory and Practice: the Need for a Critical Approach', International Journal of General Systems, vol. 10.
- Janik, A. (1986)
Tacit Knowledge, Working Life and Scientific Method
 Brenner Archive, Innsbruck University.
- Jayaratna, N. (1986)
NIMSAD: A Framework for Understanding and Evaluating Methodologies Journal of Applied Systems Analysis, Vol 13
- Jenkins, C. and Sherman, B. (1979)
The Collapse of Work.
 London: Eyre Methuen.
- Kidder, T. (1982)
The Soul of a New Machine,
 Harmondsworth: Penguin.
- Kelly, A. (ed) (1981)
The Missing Half: Girls and Science Education.
 Manchester: Manchester University Press.
- Klein, H. and Hirschheim, R. (1987)
 'Social Change and the Future of Information Systems Development', in R. Boland and R. Hirschheim (eds)
Critical Issues in Information Systems Research.
 London: Wiley.
- Knights, D. and H. Willmott (eds) (1985)
Job Redesign: Critical Perspectives on the Labour Process,
 Aldershot: Gower.
- Knights, D. and H. Willmott (eds) (1986)
Gender and the Labour Process
 Aldershot: Gower.
- Knights D. and H. Willmott (eds) 1990
Labour Process Theory,
 Aldershot: Gower.
- Kraft, P. (1977)
Programmers and Managers: The Routinisation of Computer Programming in the United States.
 New York: Springer-Verlag.

- Kraft, P. (1979)
 'The Industrialisation of Computer Programming: from Programming to Software Production', in A. Zimbalist (ed) *Case-Studies in the Labor Process*.
 New York: Monthly Review Press.
- Kraft, P. and Dubnoff, S. (1983)
 'Software Workers Survey', Computer World XVII, pp 3-13.
- Kramarae, C. (ed) (1988)
Technology and Women's Voices,
 New York: RKP.
- Kubicek, H. (1983)
 'User Participation in Systems Design: Some Questions about Structure and Content Arising from Recent Research from a Trade Union Perspective'.
 in Briefs et al (eds) *Systems Design For, With and By the Users*.
 Amsterdam: North-Holland.
- Kuhn, T., (1970)
The Structure of Scientific Revolutions,
 Chicago: Chicago University Press.
- Kusterer, K. (1978)
Know-How on the Job: the Important Working Knowledge of Unskilled Workers,
 Boulder, USA: Westview.
- Lakatos, I. (1968)
 'Criticism and the Methodology of Scientific Research Programmes', in Proceedings of the Aristotelian Society 69, 149-86.
- Land, F., Betjejaruwat, N. and Smith C. (1983)
Factors Affecting Social Control: the Reasons and Values in Systems, Objectives, Solutions 3
 Amsterdam: North-Holland.
- Latour, B. (1987)
Science in Action.
 Milton Keynes: Open University Press.
- Learmonth and Burchett Management Systems (LBMS) (1986)
Introduction to LSDM
- Library Association (1989)
 'Equal Opportunities Monitored' (a report).
- Lie, M. and B. Rasmussen (1985)
 'Office Work and Skills'
 in Olerup et al (eds) *Women, Work and Computerisation*

- Liff, S. (1986)
'Technical Change and Occupational Sex-Typing'
in Knights et al (eds) *Gender and the Labour Process*
- Liff, S. (1988)
'Gender, Office Work and Technological Change'
Paper presented to the ESRC Programme on Information and Communication Technologies workshop, Bath, April.
- Liff, S. (1990)
'Gender and Information Technology: Current Research Priorities, Strengths, Gaps and Opportunities', a Report commissioned by the ESRC Programme on Information and Communication Technologies (PICT).
- Liff, S. (1993)
'Information Technology and Occupational Restructuring in the Office', in E. Green et al (eds) *Gendered By Design? Information Technology and Office Systems*.
London: Taylor and Francis.
- Linn, P. (1987)
'Gender Stereotypes, Technology Stereotypes'
in McNeil (ed) *Gender and Expertise*
- London Hazards Centre (1987)
Report on VDU Use.
- Lovegrove, G. and Hall, W. (1987)
'Where have all the girls gone?' University Computing, 9, pp 207-10.
- Lyytinen, K. and Hirschheim, R. (1988)
'Information Systems as Rational Discourse: an application of Habermas' theory of communicative action', Scandinavian Journal of Management.
- McCracken, D. and Jackson, M.A. (1982)
'Life Cycle Concept Considered Harmful', ACM Sigosft Software Engineering Notes Vol 7 No 2, April 1982.
- McGregor, D. (1960)
The Human Side of Enterprise.
New York: McGraw-Hill.
- Mackay, H. and Gillespie, G. (1989)
'Extending the social shaping of technology approach: ideology and appropriation', unpublished paper, Department of Behavioural and Communciation Studies, Polytechnic of Wales.
- Mackay, H. and Lane, S. (1989)
'Towards a Sociology of Systems Analysts'. Paper presented to the ESRC PICT Software Workshop, Manchester, 19-20 July.

- Mackenzie, D. and J. Wajcman (eds) (1985),
The Social Shaping of Technology,
Milton Keynes: Open University Press.
- Mackenzie, D. (1987)
'"Micro" and "Macro" Approaches in the Sociology of
Technology', paper presented to the annual BSA Conference,
April, Leeds.
- McNeil, M. (1987)
Gender and Expertise,
London: Free Association Books.
- Martin, J. and Roberts, C. (1984)
Women and Employment Survey.
London: Department of Employment and OPCS, HMSO.
- Miliband, R. (1973)
The State in Capitalist Society.
London: Quartet.
- Milkman, R. (1982)
'Redefining "Women's Work": the Sexual Division of Labour
in the Auto Industry during World War II', Feminist
Studies 8,2.
- Molina, A.H. (1989)
'Transputers and transputer-based parallel computers:
sociotechnical constituencies and the build-up of British-
European capabilities in Information Technologies',
unpublished paper, Research Centre for Social Sciences,
Edinburgh University.
- Mumford, E. (1983)
Designing Human Systems
Manchester: Manchester Business School.
- Mumford, E. (1986)
Using Computers for Business Success: the ETHICS Method.
Manchester: Manchester Business School.
- Mumford, E. (1987)
'Sociotechnical Systems Design - Evolving Theory and
Practice' in Bjerknes, G. et al (eds) *A Computers and
Democracy - A Scandinavian Challenge*.
- Mumford, E. and Henshall, D. (1979)
A Participative Approach to Computer Systems Design.
London: Associated Business Press.
- Mumford, L. (1972)
'Technics and the Nature of Man', in C. Mitcham and R.
Mackey (eds) *Philosophy and Technology: Readings in the
Philosophical Problems of Technology*.
New York: Free Press.

Murray, F. (1987)

'Reconsidering Clerical Skills and Computerization of UK Retail Banking', Research Paper, Departments of Computer Studies and Applied Social Studies, Sheffield City Polytechnic.

Murray, F. and Woolgar, S. (1990)

'Social Perspectives on Software', a report prepared for the ESRC Programme on Information and Communication Technologies (PICT).

Murray, F. and Woolgar, S. (forthcoming)

Social Perspectives on Software.

Boston: MIT Press.

National Association of Local Government Offices (NALGO) (1988)

Training pack on Job Design: video and written materials. Produced jointly with APEX and CPSA.

National Audit Office (1991)

'Ministry of Defence: Support Information Technology', Report by the Comptroller and Auditor General.

London: HMSO.

Nichols, T. and H. Beynon (1977)

Living with Capitalism: Class Relations in the Modern Factory,

London: RKP.

Nicholson, L.J. (ed) (1990)

Feminism/Postmodernism

London: Routledge.

Oakley, A. (1972)

Sex, Gender and Society.

London: Maurice Temple Smith.

Oakley, A. (1974)

The Sociology of Housework,

London: Martin Robertson.

Oakley, A. (1981)

'Interviewing Women: a Contradiction in Terms?' in H. Roberts (ed) *Doing Feminist Research.*

London: Routledge and Kegan Paul.

Olerup, A., Schneider, E. and Monod, E. (eds) (1985)

Women, Work and Computerisation: Opportunities and Disadvantages.

Amsterdam: North-Holland.

Orbach, S. and Eisenbaum, L. (1983)

What Do Women Want?

London: Fontana/Collins.

- Orlikowski, W. (1989)
The Duality of Technology - Rethinking the Concept of Technology in Organisations
 Manuscript, Cambridge, Mass; Sloan School of Management, MIT.
- Pacey, A. (1983)
The Culture of Technology.
 Oxford: Basil Blackwell.
- Pelaez, E. (1990)
 'Soft Ware: the problems of producing a peculiar commodity', paper presented to the ESCR PICT Software Workshop, Oxford, 13-14 January 1990.
- Pemberton, B. (1986)
 'Management and Trade Union Response to the Perceived Implications of Microelectronic Technology in Selected Areas of the Service Sector', unpublished Ph.D. thesis, Sheffield City Polytechnic.
- Phillips, A. and B. Taylor (1980)
 'Sex and Skill: Notes Towards a Feminist Economics'
Feminist Review, no. 6.
- Polanyi, M. (1967)
The Tacit Dimension.
 New York: Anchor Books.
- Poulantzas, N. (1975)
Classes in Contemporary Capitalism.
 London: New Left Books.
- Pringle, R. (1988)
Secretaries Talk: Sexuality, Power and Work.
 London: Verso.
- Rolfe, H. (1986)
 'Skill, Deskillling and New Technology in the Non-Manual Labour Process'
 in *New Technology, Work and Employment* No. 1, Spring 1986
- Rosaldo, M. and L. Lamphere (1974)
Woman, Culture and Society,
 Stanford: Stanford University Press.
- Rose, H. (1983)
 'Hand, Brain and Heart: A Feminist Epistemology for the Natural Sciences', in *Signs* 9, 1 pp73-90.
- Rose, H. (1986)
Women's Work, Women's Knowledge,
 in J. Mitchell and A. Oakley, (eds), *What is Feminism*
 Oxford: Blackwell.
- Rosenbrock, H. H. (1983)
Social and Engineering Design of an FMS
 CAPE 83, Amsterdam.

- Rosenbrock, H. H. (1984)
 'Designing Automated Systems: Need Skill be Lost?'
 in Marstrand, P. (ed) *New Technology and the Future of Work and Skills*
 London: Frances Pinter.
- Rosenbrock, H. (1989)
Designing Human-Centred Technology: a Cross-Disciplinary Project in Computer-Aided Manufacture,
 Amsterdam: Springer-Verlag.
- Rothschild, J. (ed) (1983)
Machina Ex Dea: Feminist Perspectives on Technology
 New York: Pergamon Press.
- Russell, S. (1986)
 'The Social Construction of Artefacts: a response to Pinch and Bijker', *Social Studies of Science*, 16, 331-46.
- Russell, S. and R. Williams (1987)
Opening the Black Box and Closing It Again Behind You
 Paper presented to the BSA Conference on Science, Technology and Society, Leeds University, April 1987.
- Softley, E. (1985)
 'Word processing: New Opportunities for Women Office Workers?'
 in Faulkner, W. and E. Arnold (eds) *Smothered by Invention: Technology in Women's Lives*
- Science Policy Research Unit (SPRU) (1982)
 'Microelectronics and Women's Employment in Britain'.
 Occasional Paper No. 17, University of Sussex.
- Schneider, L. and Ciborra, C. (1983)
 'Technology Bargaining in Norway', in Briefs, U., Ciborra, C., and Schneider, L. (eds) *Systems Design For, With and By the Users*, pp 243-250.
 Amsterdam: North-Holland.
- Schwartz Cowan, R. (1983)
More Work for Mother.
 New York: Basic Books.
- Shiva, V. (1988)
Staying Alive: Women, Ecology and Development.
 London: Zed Books.
- Silverman, D. (1985)
Qualitative Methodology and Sociology
 Aldershot: Gower.
- Stanley, L. and S. Wise (1983)
Breaking Out: Feminist Consciousness and Feminist Research
 London: RKP

Star, Susan Leigh (1991)
Invisible work and Silenced Dialogues in Knowledge Representation
in Eriksson, Kitchenham and Tijdens (eds) 81-92

Stone, I. (1988)
Equal Opportunities in Local Authorities: Developing Effective Strategies for the Implementation of Policies for Women.
London: HMSO.

Strober, M.H. and Arnold, C.L. (1987)
'Integrated Circuits/Segregated Labour: Women in Computer-related Occupations and High-Tech Industries', in National Research Council (ed) *Computer Chips and Paper Clips: Technology and Women's Employment.*
Washington: National Academy Press.

Suchman, L. and B. Jordan (1989)
'Computerisation and Women's Knowledge'
in K. G. Tijdens et al (eds) *Women, Work and Computerisation: Forming New Alliances*

Thomas, K. (1971)
Religion and the Decline of Magic,
Weidenfield and Nicholson.

Tijdens, K.G., M. Jennings, I. Wagner and M. Waggelaar (eds) (1989)
Women, Work and Computerisation: Forming New Alliances
Amsterdam: North-Holland.

Turkle, S. (1984)
The Second Self: Computers and the Human Spirit
London: Granada.

Turkle, S. (1988)
'Computational Reticence: Why Women Fear the Intimate Machine', in C. Kramarae (ed) *Technology and Women's Voices.*
London: Routledge.

Vehvilainen, M. (1986)
'A Study Circle Approach as a Method for Women to Develop Their Work and Computer Systems', paper presented to the second IFIP Conference on Women, Work and Computerisation, Dublin, August 1986.

Vehvilainen, M. (1991)
'Gender in Information Systems Development - A Women Office Workers' Standpoint', in I.Eriksson, B. Kitchenham, and K. Tijdens (eds) *Women, Work and Computerisation: Understanding and Overcoming Bias in Work and Education.*
Amsterdam: North-Holland.

- Wagner, I (1985)
 'Women in the Automated Office' in Olerup et al (eds)
Women, Work and Computerisation: Opportunities and Disadvantages.
 Amsterdam: North-Holland.
- Wajcman, J. (1991)
Feminism Confronts Technology,
 Cambridge: Polity Press.
- Walby, S. (1986)
Patriarchy at Work
 Cambridge: Polity Press.
- Walkerdine, V. and the Girls and Mathematics Unit (1989)
Counting Girls Out.
 London: Virago.
- Webb, J. and Liff, S. (1988)
 'Play the Whiteman: the Social Construction of Fairness and Competition in Equal Opportunities Policies', in Sociological Review, vol. 36 no.3.
- Webster, J. (1990)
Office Automation
 London: Harvester.
- Webster, J. (1993)
 'From the Wordprocessor to the Micro: Gender Issues in the Development of Information Technology in the Office', in E. Green, J. Owen and D. Pain (eds) *Gendered By Design: Information Technology and Office Systems.*
 London: Taylor and Francis.
- Weizenbaum J. (1976)
Computer Power and Human Reason.
 Harmondsworth: Penguin.
- West, J. (ed) (1982)
Work, Women and the Labour Market
 London: RKP
- West, J. (1990)
 'Gender and the Labour Process', in D. Knights and H. Willmott (eds) *Labour Process Theory.*
 Aldershot: Gower.
- Willcocks, L. and D. Mason (1987)
Computerising Work,
 London: Paradigm.
- Williams, R. (1987)
 'Democratising Systems Development - Technological and Organisational Constraints and Opportunities'
 in Bjerknes et al (eds) *Computers and Democracy - A Scandinavian Challenge*
 Aldershot: Avebury.

Williams, R. (1990)
'Participation and New Technology: Theoretical Framework
and Research Hypotheses in attitudinal survey',
Working Paper EF/WP/90/30/EN
European Foundation for the Improvement of Living and
Working Conditions.

Wood, S. (1982)
*The Degradation of Work: Skill, Deskillling and the Labour
Process*
London: Hutchinson.

Wood-Harper, A., Antill, L. and Avison, D. (1985)
Information Systems Definition: the Multiview Approach.
Oxford: Blackwell.

Woolgar, S. and Russell, G. (1989)
'The Social Basis of Troubles with Software', paper
presented to the ESCR PICT Software Workshop, Manchester,
19-20 July.

Yourdon, E. (1982)
Managing the System Life-Cycle
New York: Yourdon Press.

Yourdon, E. (1986)
Managing the Structured Techniques
Yourdon Press.

Zimbalist, A. (ed) (1979)
Case-Studies on the Labor Process
London and New York: Monthly Review.

Interview Schedule. (EAST END ENGINEERING).

1. Yourself and your work: how long have you worked here? What post/grade did you start on? Did you receive training - if so, please describe briefly. Do you have a family?
2. Please describe what you do in your work, as it is now:
e.g. typical processes and operations; a normal day's routine; their best and worst aspects.
(Points to follow up: who plans/organises your work? do you have to do overtime - comments about this?)
3. Has the computerised procurement system altered your work in any way?
 - any general comments?
 - has it changed your working contacts/relationships with others, inside or outside the department? Any change in the atmosphere in the dept.?
 - what kind of training did you receive re. the system, if any? Comments?
 - how much use do you make of the terminals? Comments?
 - Has the pace or organisation of your work changed? Have responsibilities changed?
 - any other comments?
4. Can you compare your current work, using the computerised system, with the situation before the system came in?
 - any general comments - work pace, organisation content?
 - what would you see as the advantages of the computerised system? And the disadvantages?
 - what kind of training or preparation would a new recruit for your work need now? Would it be the same as before computerisation?
5. How was the computerised system developed and introduced?
 - How did you first hear about it - and who from?
 - How easy was it to find out about plans for the system/the system itself?
 - Were you trained to use it? (Unless covered in 3). How?
 - How much contact did department staff have with systems analysts/designers, if any? Comments?
 - Was there a prototype or pilot phase? Comments, if so?
 - Were there any problems with the initial introduction/use of the system? Examples, if so? How were they tackled?
 - How does the system compare with your initial expectations? (Re. ease of use... availability of information from it... advantages/disadvantages).
 - Did its introduction become a trade union/industrial relations issue at any stage?
6. Some more general issues regarding new technology:
 - how much difference is computerisation making to work here, and to job opportunities?

- is there any further training you would like to be able to do? Re. specific computing applications? And/or of a more general nature?
- Do you expect to still be working here in 5 years' time? What might it be like to work in the department/the firm then?

7. Final questions: some more personal aspects of contact with computers:

- how did you first have contact with/use of a computer at all?
- Do you use a computer outside work at all? Do you use one at home -do other members of your family?
- would you want the children in your family to have access to a computer - at school? at home?

APPENDIX B

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INTERVIEW WITH DEBORAH BARTON, EX STUDY CIRCLE MEMBER.

Autumn 1987.

Jenny Owen.

Q The first thing I wanted to check was that I was clear about the job that you're in at the moment - are you on grade four at the moment.

A As from..well yeh.. from the first of February it was graded backwards for.. yeh.

Q Right. And you're a team leader within the section?

A Yeh.. for the in-stock reserves, so it's.. mm.. three people.. three other people in that team, a scale three and then two scale twos I think - I'm not sure what they are.. actually on.

Q Looking at central lending as a whole, how many other people are on the same grade as you, or with the same amount of..?

A There's two others - there's three scale fours for the section.

Q So that's you and Jackie and.. one other?

A And Julie, one other, yeh.

Q Right. And was that grading up to four part of the alternative grading scheme - was that a result of that - or was it ----?

A (big sigh) Sort-of, it's something we've been pushing for for years - that we thought we should be on a higher grade because of the responsibility, we've taken on length of service - things like that. Erm.. we were recommended twice in the alternative grading for it..all three of us - and turned down.. twice.. erm.. because of the money.. situation.

Q So, not because of you, but because of the money?

A Because of the money. Er..well that was.. they were the reasons that were given. Then when the manpower plan..

Q Ah..

A ..was running at the same time.. one of the sort-of things that they said... if we give you three scale fours, will you accept the manpower plan? - It was something that was started as a bargaining.. situation and we said, well, look we'll have the (cough) scale fours, but we're not having them as a trade-off for something else. So when they actually gave us

the scale fours. they came as part of the manpower plan rather than... the alternative grading.

Q So what sort of effects did the manpower plan have?

A Personally, it sort-of put us back a little bit. Erm.. because having been given scale fours on ..the grade, on the alternative grading system, we would have got them.. '85/'86 sort of thing, and yet we've had to wait until '88 for the manpower plan, so.. financially an'.. I suppose just financially, it's put us back quite a long way. Plus we could have been moving up through the scale. But for the department as a whole, the manpower plan is a.. is a lot better. Erm.. I think, in some respects because we've lost the central children's library so we're a section on our own rather than trying to work with somebody else. And in the end, the(this?) section head wasn't down-graded at.. as it was going to be at the start of something.. I don't think we've(they've) come out of it too bad, really.

Q ..Apart from having to wait that bit longer..?

A Mmm..and it was only financial, but.. it does.. peeve you a little bit (laughs)

Q Yes, especially when you've waited a long while..

A Yen.

Q How long have you been in the library altogether - I know its a long while?

A It's 12 years in Apr..26th of April is 12 years, and I'm straight from school ----- 16.

Q So you didn't have any other job in between; its.. straight in?

A No..no.

Q The other personal question I need to ask is.. well, you live with your husband?

A Mm-hm.

Q No other members of the family, no other-----?

(loud clock chiming away in background)

Coming back to work in the section - something I've asked everyone else is, how does the job you do compare to the job description you've got?

A Very well really, because we did it ourselves (laughs). It wasn't.. erm.. there was a very sort-of vague library assistants' job description to start of with. But over the

years it changed quite dramatically as the sort-of professional/non-professional lines were eroded. Erm.. and because of the alternative grading, because of the manpower, we were continually asked to be doing our own job descriptions - so we fitted it to what we were actually doing. erm.. and that's what they built the gradings on, quite luckily. Erm.. the only things that were out in were..more to work with the subject specialists than exist. erm.. and sort of standing for them - which we did on an informal basis, but when the new job descriptions came out, that was written into themas a sort-of..more a formal thing that just sort-of happened by chance before. I think.

Q So did that happen in all the sections, or was it particularly in central lending?

A I think it was... in the two reference libraries, I think it was done slightly different - the scale fours that came about.. I think they were asked to do their own job descriptions, but they were.. specifically put down.. (pause) to cover areas... like a subject librarian. But they don't have the team situation in the reference libraries - there aren't as many staff. And we felt that we warranted the gradings on the team situation because we'd got a lot more staff and... sort-of more diverse areas - that we could satisfy it on that qualification, rather than.. saying we're going to move up to be a subject librarian; because none of us are qualified. Erm.. and yet..and knowing the science reference library, definitely they've done that - they've given the scale four a subject area to look after.. which was law(?).... which I thought was quite heavy really.. somebody with no sort-of... professional background, and had not been doing that sort of work, to suddenly say.. right..you're going to take on more.

Q Yes, it's quite hard - especially if they're short of time as well.

A Mm..it was(?) Deborah actually.

Q Yes, 'cos she's been spending time across.. I know(?) I rung to get in touch with her and she's been across in the(?)-----. Yes, that's right. So, the main duties and responsibilities you've got now - how would you summarise those?

A It's.. as a supervisor.. erm.. and team leader for that particular area of work and the staff that work in that team. Erm... is to take charge of this section in the absence of sort-of professional staff. Standing for them on any sort-of level now - subject areas as well. Erm.. and then to provide the public service; training...erm... just day to day running.. erm.. emergency procedures on the computer: if that sort-of breaks down, that's sort-of you're area to sort-of deal with, rather than.. the staff that are

actually on the counters; they keep the service running while you do the backup. So its mainly training and supervision.

Q It's a pretty broad range..

A Mmm..

Q Going back to the time when you actually started, how long did it take to feel that you more or less knew what was what in the job?

A A long time, when I started, because it was very much professional and non-professional.

Q Much more of a distinction than now?

A Mm.. when I started in libraries.. I mean you weren't allowed to do certain things.. that was a professional job and that was a non-professional job and you didn't cross over as much: you weren't encouraged... erm.. to do that. And also, that gradings were very much different: there was only one grading for non-professional staff, which was scale one.. and that was it, then. There was nowhere to go. Erm.. there was a grade one supervisory post, which is how we all sort-of started moving through the grades: they were the ones that, when they brought the new grading system in, they looked at the supervisory posts and said, right we'll make those a two..rather than a one. But until then, there'd been nowhere to go.

Q So people just stayed on one and that was it?

A Whatever...yeh, if you'd been there 20, 30 years: and whatever you were doing, you were still on grade one because there weren't any other scales in libraries at all.

Q So did people leave - did they..did that mean that people looked for other jobs because they got fed up with it or..

A They didn't really, no.

Q ..frustrated?

A ..People s...I think they move more now. I think because you realised there wasn't anything else for you to go at, you were quite content and..well, perhaps not content, but you'd realise there was nowhere else you could go, and if you wanted to stay in libraries you'd to put up with it. But once they started to sort-of dangling the carrot and saying, you can attain.. another scale, but then they still weren't moving you on it....I think that was when all this sort-of aggravation started. 'Cos it was there, but they still weren't really.. happy to move you through. Although you'd perhaps been stuck for six years at the top of the same

grade.

Q Yes, I can see that. Did it make any difference to the number of people who tried to get qualified - I don't know whether many library assistants do, or whether it's easy to -----, its not very easy to.....

A Erm... I don't think it did because.. you were.. you did have to leave - you had to give your job up. Er.. qualify and then come back. And you weren't guaranteed a job when you came back.

Q So did you have to go off and do a full time course?

A Mm..

Q ..You couldn't do a day release or anything like that?

A There wasn't, at that time, a day release to actually qualify; there was a Richmond College for a City and Guilds, which I did. Erm.. and there wasn't even a SEC course.. at that..when I first started. Then they brought the SEC course in. But again, you were discouraged from doing it because they said, well, you can do it if you want but of course it's not going to get you anywhere.

Q Because there was nowhere to go once you'd got.....?

A Yeh, there were no more grades for you to move through. So I mean, I..I didn't do it because of that reason which, with hindsight, was wrong really. But at the time, we thought well you're going to spend all that time.. doing it for no reason. And you had to take the library option. Erm.. which when I looked at it, I thought well if I take another option, I can move out of libraries and.. go into something else but.. you had to take the library option so that didn't help. But now..they will take..erm.. day release at Leeds: do you can qualify, but it takes about five years to do it on day release.

Q Is there anybody doing that?

A There..there's quite a few, yeh. I think they'll allow four a year to go or something like that.

Q That's from the department as a whole?

A As a whole, yeh.

Q But that sound a bit better than it was..

A They've been quite successful actually, the ones that have taken it - they've got quite good jobs..they've all moved into professional jobs, they've not been stuck in a non-professional job.

Q Perhaps it'll open up a bit, but it's difficult isn't it with the financial situation -----?

A It is as well because you're not.. I suppose if you're doing day-release, that's fine because you can still keep your job. But if you decide to give up your job and go and do it full time, there might not be anything for you to come back to.

Q Mm.. Have..this is a bit of a related question really..when you started, were there any particular qualifications that they asked.. that they asked for?

A For non-professional staff, we had to have five O'levels. Erm.. the professional staff.. they did(?) used to take..it was just sort-of phasing out when I started, but.. they took you on for a year (pause) with, I presume, you're O'levels and your A'levels, on the understanding that you would then go to university: go to college and do your degree. So they did then allow them to go and do a full time degree course and come back. But as I started, it was the last lot of people just more or less just coming back into their jobs. Erm.. so then you had to come in with a library..degree.

Q So, for non-professional staff now, has that changed: do they still ask for five O'levels?

A There's no qualifications at all now, so... They were recruiting from.. YTS only for a few years, so it was... YTS and then they were all kept on. And in.. the past couple of years, we've not even had YTS, we've not recruited anybody at all. Er..so what they're going to do now I don't know. There --was talk of taking YTS again.. when it changed, do I think that's the way we'll do it.

Q Within the section - well you've talked about this actually - I was going to asked you about the particular areas, but who organises the different responsibilities: is that something that you're involved in as a team leader?

A To a certain extent: the teams were devised, erm.. from sort-of areas of work that we used to do before, but individually. Erm.. and what they did was, they spoke.. they appointed..as far as I remember, they appointed the team leaders and said, well we're going to try and bring all the work under that particular area under you. And then.. Catheline Foster the librarian might say, (?) the sub-librarian got together with the individual team leaders and sorted.. the work out. Er.. to go in each team, which they thought... best suited each team:things like, erm.. overdue reminders..which had been sort-of something that had been done away on their own by one person, would be (?) thrown into a team and things like that. But then once they'd(they've) been allocated to the teams, it was the team leader's responsibility to sort out how they did it and..

who did the work and things like that.

Q So that leaves you with a bit of initiative about how things get done?

A Yeh. Really.. the..the teams were a lot better for everybody because the responsibility was passed down from the sub-librarian1: who, before used to.. organise all the jobs and the work. Erm.. and i..it went to the team leaders and then the individuals within the team - once you'd got them trained, they could see which jobs needed doing and get on with them without much sort-of prompting.

Q So how long has that been in operation - that team structure?

A It's gone on(?) for about two years.. 18 months/two years.. let me think... because the staff have been moving 'round.. within the teams. I mean, and that again goes back to sort-of sub-librarians' er.. responsibility. And that's also linked in with the alternative grading: so they get experience of all the jobs.. in the section.

Q How often do they move - or is it.. flexible? -

A To(?) try about every six months (sighs) erm.. but it depen..some teams are more complex than the others, there's a lot more jobs in some teams. And also, some people feel that they've not got on as quickly as they thought and.. an' don't understand one team(?) and don't really want to move. And then the other thing is that.. people get into teams that they don't like; they don't like the work, and they want to move quicker. So they aim for about..a.. move twice a year. But that's only for the team members - as team leaders stay. So they are...on..we have had.. one change on the team leaders, I think. 'Cos(?) you do get a bit stale.. yourself, as well.

Q Do you get training for those sort-of supervisory.. responsibilities?

A If you're lucky! (laughs). I went on a three-day supervisory course.. after I'd been in a supervisory post about..five and a half years.

Q Oh I see...(laughs) did it have much to tell you by then -----?

A Yeh, I think it did..it made you look at..at what you were doing, rather than... show you how to be a supervisor. I mean.. what I found was..i..it was when we were still doing all erm.. all the council was.. it was central person1 that were running the course, so you were on the course with somebody from other council departments; and ours. libraries. was just about the only department where the people

that were on the course were already in post. All the others were going on the course so that they could move into a supervisory... (because?) I think they got a lot more out of it than we did. But having said that, it.. they just said it was places an'... you know, there's more people wanting to go and they could(?) fit you in. And training.. outside this section hasn't always been very well done: you put your name down for courses, and.. you know, nothing every came of it. (pause) ..but er.. I think, perhaps because I had been on staff a long time - I perhaps didn't fare quite as well as some of the others: because I knew (that?) some of the others hadn't been there all that long before they managed to go.. but er.. certainly the people like Jackie and myself have been in post a long time (laughs).

Q Yes, that's right..... Have you ever had to do any branch work?

A No.. I've been out to branches a couple of times but only in sort-of things like when I couldn't get into central because of snow or bus strikes - things like that. But er.. I've never had to actually do anything -----(?).

Q And.. do you prefer the work in central?

A From what I've seen of branch work, I do.. but I mean, you never really know until you do it.. but..we're very busy in central lending and..the branches where I've been... on odd days...(pause) you know, there weren't many customers in, and there didn't seem they'd got much work to do.. erm.. back-up work. But having said that, now, with the sort-of staff situation, they're probably very busy. When you've got one or two staff there, but.... I'd much rather be in the centre of town: it's busy, you get a different cross-section of people going....

Q Right. If you were.. summing up, what would you see as the most important skills that you now need to use at work?

A (pause) (sigh)

Q It's probably very difficult..there are probably lots of them..

A Mmm... I think y..y..you're s..you're personal attitude's very important, especially when you're dealing with the public. Erm.. I think you've got to be able to listen to people. And also..because i..if you're in a supervisory post... you've got to listen.. as well. And we've got such a young staff - a lot of young women... erm.. you know, you've often got to be prepared to listen the their personal problems as well, because..they'd got some..problem at home and..they couldn't get to work or..they were unhappy at work. I think you found that---- being a lot of young women

together: and then the sort-of.. management... sort-of the first level of management being a man - they did come to the sort-of team leaders/supervisors a lot, rather than go and speak to the sub-librarian, often.

Q Yes - that's interesting - it's nice that they feel able to..

A Mm.. So I think, you've got.. you're personality's got to be.. right. And you..when you're training you're staff and supervising and also, the public side of things. I think you've got to be aware.. sort-of current awareness, as well, of what is going off. For subject enquiries, and people are coming in and.. you know, saying, oh that.. so and so that's happening on the television and you're sort-of hmmm.. what (laughs) thing that's on the television: so you've.. you've got..just got to be alert ----- think of everything that's going off in a public service.

Q Got to remember a lot of things?

A Yeh..yeh.. Or work well together, so that if you can't bring it to mind, that perhaps you can go and ask somebody else. You've got to be prepared to give and take, I-think.. and not think that you can know everything and do everything because its not the sort of job that... (pause) there'll always be a new subject that you've never heard of, or somebody asking for a book that you've.. you don't know.

Q Do you think that some of those things are.. things that women are particularly good at? ----- We've talked about how it's a job that's mostly women at the moment..?

A I think (pause) the sort-of listening side of things is. I think, we're perhaps much more tolerant of people, erm... But I..I think perhaps.. in central lending sometimes.. people were put off by seeing a lot of young women... working in there... old people.. er.. perhaps felt that if they were coming in for.. advice on particular things, erm.. that, you know, because you were young and you need.. you couldn't help them.. I think once they got over that barrier and realised that you could, it was all right. I mean, often you see... people hanging about (the clock is chiming again and it's quite painful on my ears, its so loud) at the enquiry desk and.. you know.. ask for help. When a man arrived.. but.. er.. but whether that was because they were old... the men in the department were older.. I'm not really sure that it was the sort-of age.. the age group or the male/female... kind of thing.

Q Yes. If they happen to be older anyway, its hard to separate it out, isn't it? Are there any younger men around, in the section, at the moment, or...?

A Not in the(this?) section; I think there's a few more..i..in

libraries.

Q Yes. ----- (can't hear).

A Mmm.. more than they(there?) used to be. There was.. I think there was a couple of... (pause) we had one young lad on the YTS, but e.e.. I don't know what he's done, actually. But he was wanting to sort-of go on and sort-of qualify eventually and.. move around. And he did move out of central lending when his..his YTS course was finished he was placed somewhere else, so.. I don't really know what happened to him, but...

Q Did he fit in alright, being one young lad among lots of younger women?

A (sigh) He did, but he took a bit of stick, I think (laughs). You know, because.. it is a very female.. sort-of ...typed..well.. I mean it shouldn't be, but it is, because of the concentration of women there. And I think when he..he first arrived, people thought, oh dear we're goin'a have to watch what we say; because you do talk about.. things that perhaps you wouldn't discuss... ----- well young women..when there's men there an'.... but er, once he'd been there a few weeks, we just.. treat him the same. And he was very...(pause) er.. shy in some respects, but.. very outgoing..in another way, I mean i..it never sort of dawned to him at all that I think(?), he was the only young lad there.. --- he quite enjoyed it. (laughs).

Q With the alternative grading and so on, could you see more.. young men coming in at the library assistant level.....or do you think they wouldn't?

A I think they may do bec.. with the gradings, if they realise there is a better career structure now, but I think it needs a lot of... I don't think libraries publicise themselves.. very well and I think it's one of those things that.. young lads would still see as a very sort-of 'girly-type' job. Because they don't realise.. what happened(?). There was a couple of lads came from school on their (?) a shadowing exercise. Er.. and I knew it was only a day, but I don't think they were very impressed. You know, they did shadow somebody, but I think they thought all it was was, still sat stamping books out. - They didn't see a lot of the sort-of background work that goes into it - I think that's what puts most.. I bet it puts women off as well.

Q Yes, Janice said something like that - that people her own age saw it as.. not being nearly as much as it really was.. not as demanding as it really was.

A Yeh.. I think they see the front.. sort-of counter...I mean.. most people sort-of go in to borrow a book once.. every now and again and they see somebody sat stamping a

book out and they think that's the extent of the work; and it may be for a lot of people.

Q I know in the group, we'd talked about.. when Alan and I asked you all what the best and worst aspects of the job were - most people said it's: the public are both. Is that still how you feel?

A Yeh, very much so.. I think.. it may be different in branches: I think that depends on where you work as well: I think they'd(?) get a much more personal sort-of relationship going with the borrowers in the branch because they do get to know them.. and they are regulars. Where, in central lending, you never sort-of.... You had a few regulars and.. you had a few people that you knew, but that's because they caused problems.. usually..you know, you knew them because....

Q Overdue books and so on..? Yes..

A Yeh, you knew them because they were a problem. Er.. but you were much too busy to ever sort-of.. get onto a sort-of personal relationship.. side of things, you know... People coming in and say(?) oh, I like to read such a-thing. And you haven't really time to choose books for people: you've time to show them where things are and help them, but you haven't really time to choose things for them.

Q Coming up to things particularly to do with the technology..... what was the first use that you ever made, of the computer systems in the library: was it the issuing system?

A As far as I know, yes.. It was all in when I.. arrived in central lending, anyway. It wasn't in the bran... there was just central lending and Stocksbridge branch, and as far as I know, that was the first.. use.

Q What was your first impression ----- (too faint)---- remeber.

A I was very overawed, actually, because you were.. when I started.. again, it was very different.. in central lending than.. it was a different system to what's in at the moment. And you were sort of kept away from it for the first couple of weeks. And the public - you weren't sort-of let ~~up~~ ^{loose} on the public or the issuing system for the first few weeks (laughs) - you were locked away in the work room to jacket books and.. it was.. it was built up. So you were a little bit in awe of it.. er.. Whereas now what we do is, on the first day, they go straight onto the counters - albeit it with somebody else - er.. but to get used to it.

Q That sounds much better..

A It is.. and we used..they used to practice with erm.. it looked like a..a.. we used to call it a 'spin-dryer'. it was sort-of a tall thing where you.. you put cassette tapes in ~~-----~~ and you had to practice on that, you know, away from the ^{point(?)}: you weren't allowed to use the actual terminals to start with; erm..so you thought it was much more complicated than it actually was.

Q So did people feel afraid of breaking it or messing up the tapes or something?

A I think so. because nobody really explained what was happening behind the scenes; you know, you thought that if you did.. press the wrong button or you used the pen wrong, then you were going to really.. mess it up. And it's not the case at all (laughs).

Q No: that's such a common feeling, isn't it? - I don't know if you notice new people feeling like that now, or perhaps they feel better, but...

A I think they must feel better than we did at that time, but I think they're still very.. in awe of it.. and I never used the central library before I went to work there. So it seemed so big to the branch library that I'd used: all this equipment and people running about. And then... when you're not let loose on it and you're sort-of told.. you know, you won't be able to do that for two or three weeks you think, oon dear - what on earth is it? (laughs).

Q Yes, that's right. (laughs) How long did it take to realise that it wasn't so.. awe inspiring, once you were actually(?)...?

A Quite a long ti....well once you're using it(?) you realised that the equipment itself was quite simple.. but again, nobody ever told you what was happening once.. (pause) you know, what happened to the information was you'd dealt with it at the counter. Er.. and that's only recently.. but(?) through people pushing and saying, you know, you need to know what's happening... elsewhere.

Q Yes.

A You really thought everythin'..an' in..(???) ---- computer service, things like that, sempt... terribly complicated an'.. you'd got to.. have been on the staff 20 years (laughs) ..before you knew what was happening, and it's not like that at all.

Q Do you think, having to use different types of issuing system and other access to computer technology: has that changed the skills or experience that people need..or that you need?

A In some respects, yes. I think the counter work has become.. easier.. in some respects.. erm.. and quicker. But it has taken.. (pause) what little personal contact there was, away from the central library. It's perhaps not so much again the same in branches, because there's less people going through but, erm.. I understand what they used... they always used to sort-of refer to people by name when they were giving them little cardboard tickets back.. so that they..they knew they were giving them the right tickets.. erm.. and perhaps spent more time with people, whereas now it's so quick - you shuv people through an'...

Q Yes, there's no need is there.. to know who it is?

A No, no. there isn't.

Q You just pen the ticket..

A That's right. So I think a lot of people do feel that.. if they're in the grades or.. just starting out, that all we are are.. computer operators. Er.. again, that's changing... because of.. gradings and things like that but.. I think a lot of people do feel that.. they're not librarians or library assistants any more, they operate a computer.

Q What's the most time that somebody new might spend.. on the book issuing desk? ..you know, checking...?

A Er.. (signs) three hours... at a stint.

Q So they'd still have.. they'd have something else going on during the day?

A Yeh. Usually, we(?) sort-of try and split half a day on..on.. sort-of what we call 'backroom' work - the sort of clerical side of things; and then half on the public service side of things. And for most of the library assistants, the public service side of things is the computer issuing system. It's only the most experienced staff that go on to the enquiry desk and deal with... the enquiries.

Q Right. How long would somebody have to wait before they were doing enquiry work?

A Again it..

Q Does that vary?

A ..it does depend on sort-of staff turnover, yeh.. Again, they're trying to... erm... probably some of the top end of scale two/scale three make sure that all staff on that level.. go on the enquiries - probably with somebody more experienced ...not on they're own - erm.. to give them more interest; a bit more variation but, again that depends on..

how long you've been on staff er... Somebody like... (pause)
I don't know..perhaps some of the sort-of newer team leaders
that have just become team leaders..have been on staff for a
long time: perhaps six or seven years and are only just
getting to that stage whereas... some of the others, because
they've brought new gradings in, have perhaps only been
there two or three years, but now they're getting to the
same level.

Q Does that create any bad feeling between the ones who've
been there a...

A Quite a lot.. yeh.. I mean I think everybody's glad that
they've brought a new grading system in because it helps
everybody. But again, they feel, oh well I've been here ten
years and I've had to wait all this time and I've been doing
all that - you know - and..and now somebody that's only been
there two years is getting the same reward..

Q Right.

A ..and the same job ex... you know.. job satisfaction.

Q It's difficult.

A Mm.

Q Do you notice any difference between... well this might be
difficult because of the professional/non-professional
difference but, I was going to say is there much difference
between the men and the women that you come across, in terms
of using the computer terminals, or how they feel when
they're first doing it - how competent they are?

A The men.. the men in our section are very sort-of enthusias-
tic about it; anything that came new-technology-wise -
whether it was good or bad, whether it worked or not - was
super, you know it was.. suddenly you had to do everything
on that piece of equipment and.. er.. quite honestly(?)
sometimes we used to sort-of think, well how did we do the
job before? Because they couldn't do anything unless they
used that.. terminal. Having said that, they were both
professional staff.

Q Are they the ones who've done the drama collection?

A Yeh. Erm.. and I think perhaps sometimes the women were a
little bit, ooh we didn't come into libraries to work.. with
sort-of new technology. Sort-of ...never sort-of thought
that it'd come in.. as much as it did. And again, I think
perhaps feeling that.. they were getting to be a.. you know,
a terminal oper...you know, a keyboard operator rather than
a..a personal service.

Q Right, right. That's interesting about wondering how the

men would have done some jobs before.. when there wasn't a computer: what kinds of things were they, that they particularly wanted to do on the computer?

A Erm.. statistics, a lot of things like that.. went on. But in some instances it seemed to make it much more complicated, because we only keep very simple statistics, ...and it did seem to make it a very complicated procedure rather than what we'd already been doing.. (laughs) you know, but it had got to be done because now there was a terminal there and we could put it onto the terminal, you know, n'there's a disk and things. Erm.... (pause) (well,-----) ..erm.. all the..sort-of daily worksheets that you used to do; I mean all you have to do is... we've got a piece of paper and you fill names in at the side of times. But suddenly, because we'd got a screen, that could all be done on the screen, you know. And.. because we'd got a lot of staff and a lot of different days of and things like that, you were..you were often rubbing things in and out - and a pencil and a rubber seemt much easier than having to load a disk in and.. alter all the information on there, but.. you know, it was all 'we much use the new technology', so..

Q And is that how it stayed? - sort-of.. did all those ---- stay?

A Some.. some things have: the statistics, certainly, have stayed on there.. erm.. But the silly thing was as well, that they were sort-of.. keeping dual sets - they still wanted to do it in the old way, in the sort-of ledger, and put it on there - they should have abandoned one or the other really... er.. and part of the worksheets, we did. The timetables for the senior staff that worked on the enquiry desk, because there weren't so many of them.. er.. stayed on there but.. it was..myself, Jackie and Julie that..mainly did..the daily work sheets for the library assistants and we refused really to.. we.. it was much too complicated, we thought, to do it on there and... what we said was, if you devise a simple... system or a simpler system to do it on there, fine, but..it..it was taking us much longer and was much harder work to do it..

Q Right.. so it came back to the old.. way of doing it?

A Mmm.. yeh.

Q That's interesting. I know we.. the other question that we raised in the group was.. 'whether any of you used a home computer, and it was only Lorraine that did.

A Mmm...

Q I don't know if you're feelings have changed about that: whether you'd ever see yourself wanting to...?

A I..I may do.. (sigh) erm.. (sigh).. I don't..I don't really know: I can never sort-of think well, what I'd use it for. I mean, we have got one. Erm.. but it only a very simple..it's only a Spectrum, a very simple one. But I can't really..honestly think what I would use it for.

Q What about your husband - does he use..?

A He did when we first got it - I think it was a novelty thing - what..what we did was, when he..he was made redundant he went on a..a retraining course and he was doing all computer-aided design and computer-aided machining - things like that. And he was very sort-of much into it. Erm.. and he bought one and he did use it quite a lot when he was on the course. But then of course, when he got the job, and went back to work and..he's not doing an awful lot with the computer - and it has helped - he is using a little bit of it - it's sort of dropped off ----- you know, he isn't so(?) enthusiastic with it.

Q What sort of job did he get, in the end?

A He's... er, engineering now er.. at Morphy Richards.. he..he did get a..(pause) luckily it turned out better because(?) he did get a better job in..in the long run; sort-of more promotion prospects. And they are just sending them on another computing course, 'cos they are getting new equipment in and so.. it will have helped him in the long run.

Q Right. Oh, that's interesting... What about.. well, I don't know if there are any other.. any children in the family: you know, your nieces, nephews or.. you know, kids that you know but, would you see it as important for them to learn how to use computers... or something they could do when they were grown up, if they wanted?

A Mmm.. I think so because I think... the more and more you see sort of any sort of industry, or even.. sort of small public service... departments now, something is.. computerised - or likely to be in the near future - and I think.. they just.. it should be just a normal.. like learning to read and write is now - I think it will become, yes, you'll learn basic computing skills - if nothing else.

Q Right. The last thing really to do with this, before we go onto the study circle in particular: what about other sort-of, quote, 'technical' things at home - who mends things, between the two of you?

A Stewart does! (laughs)... especially now because, he working for Morphy Richards. And so.. sort-of household things. you know, everything's taken apart and inspected and put back together again. But having said that, erm.. he's always worked in the sort-of mechanical engineering, so I've got a very good idea of what's going off, even sort-of you know,

car-wise and.. because he's always sort of talked about his(?) work and.. he moved from quite heavy engineering - sort of traction motors for British Rail - to sort-of small domestic appliance, he did.. change..

Q Was it GEC traction then?

A Yeh.

Q Oh right, I remeber going on a visit 'round there, yes.

A Yeh, erm.. you know, he moved from heavy industry to sort-of household electrical so he did diversify quite a lot so.. he talked about it a lot, so.. I've got quite a good idea of what's going off, but I don't tackle it really. (laughs).

Q No - it sounds nice to have and idea though, because it's often all a bit of a mystery, isn't it?

A Yeh, yeh,... plus I mean you can sort-of, when he comes home and he is talking about things, I know what he's talking about.

Q Yeh -----

A Rather than -----.

Q (laughs) Right. Coming onto the study circle.. we talked oh, in one of those meetings that we had, about how.. most people had thought it was something different from what it really.. turned out to be. What encouraged you to come on it at all? ..or..?

A In the beginning, because I thought we should know more about what we were actually working with. And it was sort-of put over.. as there(?) was going to be input from.. the non-professional staff or the lower gradings, onto something that was going to be very important in the future. Er.. and I think (pause) you needed to learn more about it to be able to put very valid points.. forward. Trouble is, at the beginning.. we were sort-of floundering a little bit. Much(?) towards the end you were much more confident and felt that you knew what you were talking about.

Q So.. can I ask you how useful it was, or wasn't, for some particular things: for instance, to what extent did it give you any more information about library work.. at a general level?

A Not an awful lot. I think we've..we've perhaps followed it through a little bit more and you knew what was happening to.. the tapes that you'd recorded your information on.. every day. And you perhaps realised why.. your contact with computer services perhaps wasn't as good as you thought it ought to be, or..better than it..you thought it was and..

you understood problems like that but (pause) ..for myself, library work..perhaps not an awful lot and I haven't..

Q I haven't been there for such a long time that I've(?)...

A Yeh.. somebody that perhaps hadn't been on staff quite as long might have found it a lot more.. useful.

Q That's right. With the information ab..coming to the question of information about computing: to what extent did it help you to..to know more or be able to put forward a few (ideas?)?

A A lot. Er.. particularly I think.. that(?) outside our own system, about the integrated systems and things like that because.. again, with having sort-of gone on.. erm.. to be(?) training of the staff, you've sort-of ferreted about and found out quite a lot about your own system anyway - so that you could explain better to..to new staff, but.. as far as other people's sections..er..were concerned, and new technology that we'd never used ourself or.. other people's systems... it was invaluable really.

Q Right. Did it make any difference to the contact you had with colleagues outside your own section?

A That again was..very good, yeh, you felt that you.. you could contact somebody in another section without... erm.. (sigh) not feeling silly, but..quite often.. because you'd not..I mean I'd been there a long time but never worked in another section; you knew vaguely what was going off.. but there'd never been much integration, so you never really knew...who to approach and what sort of reaction you were going get..from them, but I think we all learned how each other's sections worked.

Q That certainly seemed to be a good part of the discussions at the beginning.

A Yeh, it was.. that's right.

Q And the last thing: what about.. access to management processes. That may be something that you were fairly familiar with anyway, from years of experience?

A Yeh...it was, but I think again.. I mean we never had the opportunity to talk to the DMT'ers, as such, before really. Or..erm..from some of them, to feel that you were really.. putting something valid forward. I mean I got a feeling from the others that.. for some of them.. sort-of Keith mentioned originally(?) you would never have sort of got through to him really that you'd got a..as valid(?) a point, but I think (some? sounds like 'from') of the others were quite enthusiastic about it.

Q Yes, and that seems to have carried on - I think, erm.. particularly from Maryla - she's made comments since. Kind-of.

A And..and it's certainly..I mean I felt that..having been there all those years. I mean I don't know... how well I was known, sort-of outside the section, but it certainly made you feel that...suddenly other people knew you were around. Erm.. because you were getting contact with.. the high..the sort-of higher management. I mean, they may have known you anyway but it's just that you didn't have much contact with them.

Q Yes, it sounds better -----(?)

A Erm..but they were much more sort-of...just even at coffee breaks, they'd come and sit and talk to you because...suddenly you were a face that they knew. So you..I mean you felt much more confident with them anyway, rather than..they'd(?) been..at(have?) an office over there somewhere.

Q Right. Erm.. the fact that it was an all-women group, I know we talked at the end about whether it should be and most people felt oh, you couldn't really lay that down as a rule but, do you think it made a difference - to our first group - that it was all women?

A In some respects, yes, erm...because I think... the men that are on staff..er..I think again, it's different, because of the professional and non-professional. If men had have been involved, they would have all been at a professional level, I would have thought; and again, taken over - been very dominant. Erm...an'..an' I don't really know if there's been sort-of... younger men on the same level: I don't know how things would have gone really, like that.

Q Yes. I know in the... among the ones who've asked to go on the next group, there's just one man. I should imagine that wouldn't be a problem...

A Mm. But I did feel... erm... I don't know if you were there or.... Do you know when the people from the unions came?

Q Mmm..

A Er... I mean, I felt... very much sort-of intimidated there, because... two... I can't remember their names and I don't know where they are from, but two of the gentlemen there..erm... were being very...pushy..again, and saying you should have done this and you should have done that. And I..I mentioned it and one of the women from one of the unions said to me, well that's exactly what you're doing now is putting us down - by being so forceful.

Q Is that when we had that meeting?

A Yes.

Q I remember Mark Bennet being there and there were some people from London as well, yes.

A Yeh, that's right. And...I felt they were doing..exactly what they said (pause) they weren't doing.. (laughs) I don't know if you.. do you know what I mean?

Q Yes, they were being a bit, offputting or what have you?

A Yeh, yeh. You know, and saying, I can't see that women do feel intimidated by men at all; 'DO YOU?' sort of thing. And even though you were saying, yes and you're (sort-of) doing it in some respects now - they still couldn't see it.

Q Yes, I remember that. That's the last, well one of the last, points about the study circle: did it make any difference to the contact you had with the union at local level, or to what you thought it should be doing?

A No, it didn't really. (pause) That was the only contact I sort-of had with..people from outside.

Q Yes. Did you have a dispute in central lending? - I know you had.. I think you had one shortly before the study circle.

A Yeh, we did. Again, that was all linked in with er.. now then I don't know whether it was linked in with alternative grading or manpower because it got so confused but.. that was when erm... a part-time non-professional member of staff left, and they weren't replaced. Then what happened was they put er.. a professional member of staff into the department - as sort-of an extra member of staff, but not to do the duties that actually needed doing.

Q Right (laughs).

A And I'm not sure whether it was alternative grading or manpower now.

Q So did Nalgo get involved in that?

A Very strongly actually, yeh, because...i..I think they felt that we'd got to make a stand because we could see that things were going to get worse - with the sort-of money situation - that if we didn't do it there and then..and they were very supportive, at that stage. Plus we'd got a very good shop steward at..at that stage, which...recently, central lending's not had a shop steward.. at all.

Q That's difficult isn't it?

A Yeh. Erm..you know and.. I think you do need somebody in the section that un..understands the section's work and Sue was a very good shop steward. Erm.. but, yeh..we stuck it out and... I don't know what happened in the end (laughs).

Q I seem to remember, it got resolved one way or another before the group started -----.

A It did, yeh. I think what they said was that the member of staff - the professional member of staff - was having to do.. some non-professional work as well...and we were allowed to call emergency... staff in, to cover for it.

Q The last thing to do with this: erm.. how did you find it doing the visits, when it was a question of going out and talking to branches and so on.

A I found it very easy to do personally..erm.. perhaps because we'd spent such a lot of time talking to other people; and being involved with yourself as well, from an outside... organisation. But I still felt the staff were very... uneasy, because they'd not been in...they were perhaps like we were to start with: oh nobody's - it's no point because nobody's going to listen to us and we're not going to get anything out of it. And a lot of them were very unresponsive. Er.. I mean at - I think it was at Hillsborough branch library - Jackie and I went together, and we didn't get a word out of anybody.

Q Doesn't that feel awful?

A Yeh, an'.. you know, we were sort of... I think we worked very well together and we were sort-of backing each other up and, you know..sort-of saying, isn't it? or wasn't it? and that (laughs) and there was.. no response whatsoever, you know: no sort-of, even 'Oh well thank you for coming' or 'It's been interesting', you know, and even to say 'Well I don't think we can participate, but it was nice to know what's been going off' - there was just nothing at all.

Q Yes, that feels horrible.

A It was dreadful, yeh. But er..most of my others were quite..quite good; people were very interested - probably only to have a good moan about what had happened in the past but again, it was good, yeh.

Q Right. Is that similar... having done those visits, were they similar to anything you'd ever had to do before?

A No..erm.. perhaps only, sort-of in group training, where we've sort-of trained a section of staff. Erm..or.. reported back to your own section on particular things that you've been involved in. But it wasn't like going out and talking to people that you didn't know at all, and you felt that you

were trying to sell...something ---- a little bit.

Q Which is difficult, isn't it?

A Yeh...

Q Yeh.

A ..And I'm sure some of them still thought.... er..we were sort-of very.. very confident and.. and high powered and.. ooh dear, you know, who are they coming to speak to us. And I know both Jackie and I did try very much to sort-of play that down, because at..at one visit we did together they did say, oh we won't have to talk to people like you're doing, will you? You know.. and we said, well perhaps we wouldn't have been confident to do it to start with, but it did build your confidence up, because you knew what you were talking about.

Q Right. Coming onto the future really. Erm.. about the eventual integrated system or whatever happens: what would you like to be the effects.. at the level of job that you do; how would you like it to change things or support the work that you do?

A, I think I'd like it...to make.. I don't... to be able to give you more personal public contact..rather than take it away as it has done before. Erm..so that it's a good enough system - it's going to be quick to get people through - and yet...so that you could perhaps spend more time with them...in another area: it'll release you to do perhaps, more personal enquiries - rather than just speading the whole system up. And sort-of a bit more efficient. And I think people then would have more confidence in it. Because I think now - this system that we've got now at the moment - people think it's brilliant and think it can do more than i..it can. And when you say, I'm sorry - we can't do that, they lose all confidence it it.

Q - Beyond just those particular things?

A That's right, yeh. ----- as well, students and people that do use other...say, use the Poly. and the university, where they have got a better system as well.. they expect it.. from the public service as well... probably more so

END OF SIDE ONE

SIDE TWO

Q In terms of the process of involving library assistants through study circles and whatever else happens, what would you see as the best possible.. what would be the best outcome of all that?

A I think that when they actually got the system, we'd feel confident in using it. Erm...and knowing what they could get out of it themselves, and what they couldn't get out of it. Plus, that when they came to actually...training on it, they'd know...what to expect, what to ask. Because I found one of the main problems with the sort-of..the erm.. Plessey 70/50 system when that came in: I went on the one-day course that Plessey did for us and (laughs) we didn't know what to ask because it was more a...just a demonstration. And then they left the equipment there, set up, and said 'Right, you play with it, you find out.' And because you didn't know how it worked, or what to expect from it, you couldn't ask the right questions.

Q Did people actually play with it to find out?

A We did, yeh. Mike and I spent...hours and hours...in the room and... they didn't leave us.. erm.. what I expected when you get a new system is that you'd get a step-by-step instruction for every function. You didn't get anything like that! We sat and worked it out ourselves. You know, we want to renew a book - how would you renew a book. And we wrote it down step-by-step, as it worked. If it didn't work, we had to cross that out and start again. And it..it was ludicrous, really, I mean I don't know why we let it... I mean, talk to other people later on - I don't know why we let it go on - we should have had them back really and said 'You sit down with us and do that; it's not us to sort of really... find trial and error.' But that's how we did it. And we wrote it out and (laughs)... you know, just spent hours..playing with it. Erm... Perhaps other staff had more confidence in it because we got all that sorted out before we went and trained the others... and said, right: this is how it works; and whereas, I think we felt a bit, 'ooh dear, have we done it right or is there some other way or some better way you could do it.'

Q That sounds quite hard going really.

A Yeh. Plus, everything was...(sigh) run from Birmingham then as well. So they weren't..just if you were stuck, you couldn't just ring someone up and they'd say 'Oh, well I'll come over and give you a hand', it was sort-of over the phone from Birmingham sort of thing.

Q Hard going?

A Mmm..

Q The last thing is... really coming back to you in your own future... I don't know whether you're expecting to come back to the library at some point, after having the baby, or whether you're going to -----.

A I'm not going to go back in...well, I'm going to see really,

but... in my own mind, if everything's alright and, you know, I'm happy, I'm not intending to go back after sort-of... maternity leave but..I can't see myself staying at home...for years. Erm.. and unless I do any retraining, that's all I'm trained for: to go back into libraries.

Q Do you think you'd want to go back into libraries eventually, once you were.. settled with the family and so on?

A I think so, yes, yeh. But I think I'll have to try and sort-of keep very muck up with things. And it's a sort-of.. a job that is changing, and as I said before you've got to be very aware of what's going on..to.. you know, to do it properly.

END OF INTERVIEW

Sheffield Libraries and Information Services
LIBRARY MANAGEMENT SYSTEM

**COMPUTERS
&
PEOPLE PROJECT**

Sheffield Libraries and Information Services

LIBRARY MANAGEMENT SYSTEM

INTRODUCING SHEFFIELD LIBRARIES AND INFORMATION SERVICES

Sheffield Libraries and Information Services deliver a wide range of services both traditional and non-traditional, in a variety of media and formats, to a local population of over half a million people, as well as to special groups, organisations and industry and commerce. The department is one of the four largest public library and information services in the country, and has long enjoyed a high reputation for the quality of its services. Specialist sections deal with client groups as diverse as local government, multicultural services, the metals industry world-wide, and the local Crown Court.

Service Points

The service is delivered via 35 community libraries, 120 mobile library stops served by four vehicles, 80 social care homes, a service to the housebound, 300 hundred schools, deposit collections in numerous community sites, six hospital libraries, an information service serving council departments, librarians/information officers seconded to five large council services, and a large Central Library containing Central Lending, Central Children's and Music and Video lending services; Arts and Social Sciences, Local Studies, Archives, Science and Technology, Business, and World Metals information services, as well as the Sheffield Information Service itself; Administration and Bibliographical Services sections; and support sections such as Photographic, Technical Support, and Personnel.

Computerisation

The department has had a computerised circulation control system since 1974. Originally this covered only the Central Lending Library, followed shortly after by one of the larger branches. Since then the system has been expanded using successive generations of hardware and software, and now serves the Central Lending and Central Children's libraries, and 32 branches. The current system is off-line, batch supported by the Council's ICL mainframe. The main files resident on the mainframe are accessible on-line via a local network within the Central Library, but no access is available from branches. Information sections in particular are making increasing use of remote databases via PCs, with access to some 500 databases and this is seen as an area of rapid future growth. Two sections also have PCs with CD-ROM facilities, and eight CD services are currently in regular use. Most sections are in the process of developing their own local databases.

The department is responsible for the running of a local viewdata service based on the Council's ICL mainframe, and this is currently available from fifteen terminals sited both in community libraries and in other departments. To support the circulation control system, the Short Title File was created, and this is used as an

Sheffield Libraries and Information Services

LIBRARY MANAGEMENT SYSTEM

cont'd.

on-line catalogue by the Central sections. In addition, a COM catalogue of adult non-fiction is produced quarterly from records enhanced to MARC standard by data downloaded from the British Library databases and other sources, and from cataloguing data created manually. The systems currently in use are approaching the end of their predicted useful life, and the department therefore intends to replace them with a totally new turnkey system, which will supesede all the systems currently in use, and encompass those aspects of the service and support functions not already computerised, including the mobile service and acquisitions. The experience of computer applications gained over the years is being harnessed in the preparation of a specification, drawing on the knowledge and expertise of all levels of the staff. A substantial role is being played by a team of library assistants who are part of the group preparing the specification, which will be responsible for the selection, acquisition and implementation of the new system.

Sheffield Libraries and Information Services

LIBRARY MANAGEMENT SYSTEM

SHEFFIELD LIBRARIES BOOKS & OTHER MATERIALS ISSUED 1987-88

| Library | Total Books | Tot. Non-Bk | Tot.1987-88 |
|--------------------|------------------|----------------|------------------|
| Beighton* | 46,327 | 1,055 | 47,382 |
| Broomhill | 235,136 | 4,478 | 239,614 |
| Burngreave | 66,004 | 2,640 | 68,644 |
| Chapelton | 204,816 | 18,957 | 223,773 |
| Concord | 32,070 | 562 | 32,632 |
| Darnall | 182,078 | 0 | 182,078 |
| Ecclesall | 246,444 | 6,872 | 253,316 |
| Ecclesfield | 131,321 | 4,036 | 135,357 |
| Firth Park | 187,597 | 3,197 | 190,794 |
| Frecheville | 139,264 | 3,412 | 142,676 |
| Gleadless | 120,653 | 1,919 | 122,572 |
| Greenhill | 197,413 | 3,677 | 201,090 |
| Grenoside | 53,648 | 0 | 53,648 |
| Hackenthorpe | 119,855 | 0 | 119,855 |
| Handsworth | 103,644 | 923 | 104,567 |
| Hemsworth | 77,068 | 1,053 | 78,121 |
| High Green | 65,066 | 1,398 | 66,464 |
| Highfield | 167,103 | 7,860 | 174,963 |
| Hillsborough | 239,743 | 7,093 | 246,836 |
| Jordanthorpe | 124,712 | 16,069 | 140,781 |
| Lane Top | 145,195 | 5,397 | 150,592 |
| Limpfield | 31,242 | 554 | 31,796 |
| Manor | 281,296 | 8,855 | 290,151 |
| Mosborough* | 38,025 | 897 | 38,922 |
| Newfield Green | 116,229 | 2,329 | 118,558 |
| Oughtibridge* | 30,162 | 1,056 | 31,218 |
| Park | 78,121 | 2,357 | 80,478 |
| Parson Cross | 120,643 | 3,085 | 123,728 |
| Southey | 190,537 | 4,652 | 195,189 |
| Stannington | 66,310 | 1,182 | 67,492 |
| Stocksbridge | 57,471 | 3,357 | 60,828 |
| Totley | 185,079 | 7,362 | 192,441 |
| Upperthorpe | 93,549 | 1,708 | 95,257 |
| Walkley | 126,937 | 1,500 | 128,437 |
| Woodhouse | 166,172 | 5,199 | 171,371 |
| Woodseats | 227,149 | 6,082 | 233,231 |
| Sub-Total | 4,870,937 | 146,715 | 5,017,650 |
| Central Children's | 88,536 | 2,359 | 90,895 |
| Central Lending | 1,083,907 | 22,677 | 1,106,584 |
| Music & Video | 0 | 163,934 | 163,934 |
| Sub-Total | 1,172,443 | 188,970 | 1,361,413 |
| Mobile & Special | 578,811 | 9,980 | 588,791 |
| Sub-Total | 578,811 | 9,980 | 588,791 |
| Community/Central | 6,622,189 | 345,665 | 6,967,854 |
| Schools | 122,216 | 3,344 | 125,560 |
| TOTAL | 6,744,405 | 349,009 | 7,093,414 |

* Served by Semi-trailer library

N.B. These figures will be substantially increased by the new Community Library at Waterthorpe, opened this year.

Sheffield Libraries and Information Services

LIBRARY MANAGEMENT SYSTEM

ENQUIRIES, CENTRAL SECTIONS, 1986-87

| Section | Total enquiries 86-87 |
|-------------------------------|-----------------------|
| Arts & Social Sciences | 50,433 |
| Business | 60,414 |
| Central Childrens | 6,350 |
| Central Lending | 61,150 |
| Local Studies | 23,988 |
| Music & Video | 17,400 |
| Science & Technology | 62,660 |
| Sheffield Information Service | 34,829 |
| TOTAL | 317,224 |

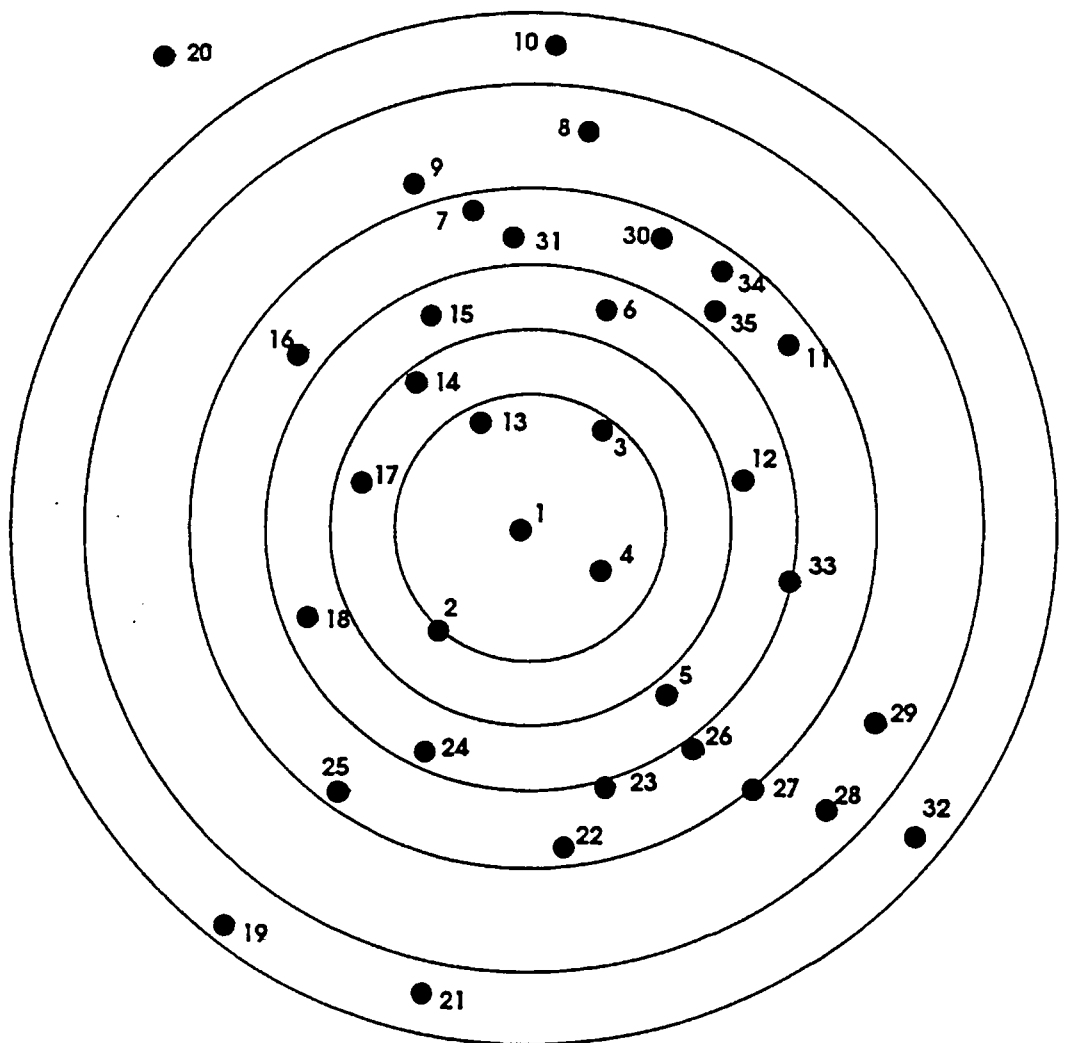
Sheffield Libraries and Information Services

LIBRARY MANAGEMENT SYSTEM

KEY TO COMMUNITY LIBRARIES

- | | | |
|--------------------|--------------------|------------------|
| 1. Central Library | 13. Upperthorpe | 25. Greenhill |
| 2. Highfield | 14. Walkley | 26. Gleadless |
| 3. Burngreave | 15. Hillsborough | 27. Frecheville |
| 4. Park | 16. Stannington | 28. Hackenthorpe |
| 5. Manor | 17. Broomhill | 29. Woodhouse |
| 6. Firth Park | 18. Ecclesall | 30. Lane Top |
| 7. Parson Cross | 19. Totley | 31. Southey |
| 8. Ecclesfield | 20. Stocksbridge | 32. Waterthorpe |
| 9. Grenoside | 21. Jordanthorpe | 33. Handsworth |
| 10. High Green | 22. Hemsworth | 34. Concord |
| 11. Tinsley | 23. Newfield Green | 35. Limpsfield |
| 12. Darnall | 24. Woodseats | |

Circles at 1 mile intervals, centred on Central Library.



Sheffield Libraries and Information Services

LIBRARY MANAGEMENT SYSTEM

COMPUTER SYSTEMS CURRENTLY IN USE

| | |
|--------------------------------------|--------------------------------|
| <i>Circulation Control:</i> | DS Hardwire DS 7050 |
| <i>Circulation Control-Non-Book:</i> | Lygo Video Manager Plus |
| <i>Local Network:</i> | DRS 150, serving 12 terminals |
| <i>Microcomputer Applications:</i> | Tandon PCs, IBM-AT compatibles |
| <i>Spreadsheets:</i> | Supercalc 4 and 5 |
| <i>Databases:</i> | Dbase 3+ and Inmagic |
| <i>Comms:</i> | Headline Chit-Chat |
| <i>Desktop Publishing:</i> | Apple Macintosh SE |
| <i>Viewdata:</i> | ICL Bulletin |

Sheffield Libraries and Information Services

LIBRARY MANAGEMENT SYSTEM

ANNUAL VOLUME INDICATORS

Materials Acquisition

| | |
|------------------|---------|
| Titles acquired | 30,000 |
| Volumes acquired | 150,000 |
| Material formats | 20+ |
| Cost Centres | 130 |

Cataloguing and Classification

| | |
|---|-------------|
| Current records in computer file <i>(representing 1.2 million items)</i> | 365,000 |
| Current records in COM catalogue | 165,000 |
| Current records in Master file | 265,000 |
| Potential records in computer file | 2.1 million |
| Annual additions (records) | 150,000 |
| Annual deletions (records) | 130,000 |
| No. of service locations | 100+ |

Circulation Control

| | |
|-------------------------------|--|
| Circulation transactions | 14.2 million (of which 2.4 million via Central Lending Library) |
| Items on loan at any one time | 360,000 |
| Book reservations | 85,000 |
| Registered readers | 270,000 |
| Max. hours open per week | 65 |
| Inter-library loans | |
| <i>In</i> | 2,925 |
| <i>Out</i> | 616 |

Sheffield Libraries and Information Services

LIBRARY MANAGEMENT SYSTEM

COMPUTERS AND PEOPLE PROJECT

When it was decided to prepare a system specification in anticipation of the need to replace our existing computer systems, there was agreement within the department that a substantial degree of control over the specification and selection of a system should be given to those members of staff for whom use of that system would form a major part of their day to day duties. This coincided with the department's involvement in a project at the Polytechnic called Human Centred Office Systems. The project team were considering the involvement of women in information technology, and based on work previously carried out in Scandinavia, were organising a number of "Study Circles" consisting of a number of women library assistants, with the aim of raising awareness of computers and related technology, and building confidence in the members.

It was anticipated that involving library assistants in the specification and selection process would meet problems, first of all in persuading them that they had a contribution to make, and also in giving them the confidence to make that contribution. It was therefore seen that the "Study Circles" would provide a vehicle for giving staff the backup needed to allow their full participation in the process. An Action Group was formed to draw up a specification which reflected the needs and views of the widest possible range of staff, and to carry through the process of selecting and implementing the chosen system. Membership of the group consists of staff drawn from all parts of the department, and all strata of the staff. Since, by virtue of their work, a number of those involved are senior or middle managers, it was decided that library assistants should constitute half the membership.

COMPUTERS AND PEOPLE ACTION GROUP MEMBERSHIP

Peter Bayliss *Computer Development Librarian (Convenor)*
Alysoun Bagguley *Senior Subject Librarian, Science & Technology*
Peter Barr *Group Librarian*
Denise Burnand *Senior Library/Information Assistant*
Sara Cokeham *Senior Library/Information Assistant*
Pamela Holland *Children's Library Assistant*
Michael Hudson *Principal Librarian, Bibliographical Services*
Sue Hulse *Library/Information Assistant*
Nick James *Senior Bibliographical Librarian*
Lorraine Jubb *Community Librarian*
Trudie Kemp *Bibliographical Assistant*
Lynne Knowles *Library Assistant*
David Littlewood *Systems Technician*
Alan Nash *Principal Training Officer*
Maryla Smith *Assistant Director, Materials Resources (Chair)*
Mike Surr *Senior Subject Librarian*
Lorraine Wojnicz *Library/Information Assistant*
Ian Franklin *Sheffield Polytechnic*
Jenny Owen *Sheffield Polytechnic*
Den Paine *Sheffield Polytechnic*

D.M.T.

PROJECT LEADER

Chairs meetings
Monitors progress
Liaises with / reports to DMT

Is involved in: Planning - timescales
- deadlines
- targets

- Supplier negotiations
- Contract formulation
- Report Writing

PROJECT MANAGER

Liaises with: - I.T. Services
- Suppliers
- G.M.F.
- G.L.'s and Section Heads

Convenes Action Group
Co-ordinates information for the staff bulletin
Chairs the Technical Support Group

Is responsible for: - Report Writing (in conjunction with Project Leader)
- Day to Day monitoring of progress
- Technical control

PROJECT TEAM

MEMBERSHIP

Colin MacDonald
Peter Bayliss

ACTION GROUP

Represents the interests of all levels of staff, and all major sectional interests.

Specifically responsible for:

- communicating with identified areas of the staff
- identifying issues and areas of concern on the part of staff
- reconciling and adjudicating on areas of conflicting interests, (with reference to DMT as necessary.)
- producing a regular information bulletin
- chairing sub-groups
- reporting to and from sub-groups
- participating fully in the work of the sub-groups
- deciding the membership and aims and objectives of the sub-groups
- co-opting others members of the sub-groups
- following up implementation and monitoring effectiveness
- setting up post-implementation User Groups
- liaising with existing task / policy groups.

JOB DESIGN & HEALTH AND SAFETY GROUP

Aims and Objectives

- To produce appropriate RTC's
- To identify health and safety issues
- To find creative solutions to problems arising from changed work patterns and methods
- To negotiate the implementation of these solutions

Membership

Nick James (Chair)
Alysoun Bagguiley
Pam Holland
Mike Surr
Lorraine Wojnicz
Jenny Bristow
NALGO representative ?
Safety Representative ?

TECHNICAL SUPPORT GROUP

Oversees the technical aspects of implementation
Carries out the SLIS component of the technical implementation

Liaises with supplier's staff
Liaises with IT Services staff as necessary
Liaises with operational library staff
Advises other groups on technical aspects of their work
Monitors day to day progress and reports to the Project Team and Action Group
Carries out early identification of technical problems and formulates solutions in conjunction with other groups

Membership

Peter Bayliss
David Littlewood
John Shanley
Mick Crofts
Mick Spick
IT Services representative (operational)

TRAINING GROUP

Aims and Objectives.

- To ensure the content of the training programme meets the requirements of staff and the objectives of the new system.

Specifically:

- To assess training needs
- to carry out a skills audit of the staff
- to assist in the design of the training programme
- to co-ordinate the implementation of the training programme
- to liaise with
 - the supplier's staff
 - operational staff

Membership

Diane Kostka (Chair)
Peter Bayliss
David Littlewood
Alan Nash
Sue Hulse
Jacquie Chase
Trainer(s)

PROJECT

STRUCTURE:

JULY 1991

APPENDIX D

Library Study Circle, Draft Programme, Jan. 1988.

25. Jan.

1. Getting to know you and brainstorming.

Homework: researching the current use of new technology in individual areas of work, eg at branch level.

8. Feb.

- 2.1) Report back on homework.

11) Discussion of work issues specifically related to women eg job satisfaction, promotion prospects, attitudes towards work, health and safety issues etc.

23 Feb

3. General question and answer session with computer 'experts' in project team and related preparation for visit to library with installed integrated system (venue to be decided).

4. Library visit (whole day).

5.1) Report back on visit with 'experts' there for information and discussion.

11) continuation of discussion of work issues, eg how job re-design might affect women's jobs.

6. Visit to local library computer room.

7. Final session.

REPORT OF THE CENTRAL LIBRARY STUDY CIRCLE ON NEW TECHNOLOGY

MEMBERS OF THE STUDY CIRCLE: Jayne Stewart (CST), Deborah Woods (CST), Deborah Barton (CLL), Jackie Chase (CLL), Lorraine Wojnicz (CAS), Janice Webster (CAS)

FACILITATORS: Fergus Murray (Sheffield City Polytechnic), Jenny Owen (Sheffield City Polytechnic), Alan Beevers (RA)

This report is the joint effort of all the above.

1.0 Background

1.1 Human Centred Office Systems is the title of a research project being conducted by Sheffield City Polytechnic. During 1986 a number of possible case studies within Sheffield City Council were investigated, including the Libraries Department.

1.2 Sheffield City Libraries has partly automated its "housekeeping routines" (Circulation Control, Book Ordering, Cataloguing). There now exists considerable management interest in introducing an advanced integrated system in the early 1990s.

1.3 Sheffield City Libraries has a commitment to staff involvement in decision making and policy development. It therefore seemed appropriate that a research project geared towards developing a human-centred approach to systems design should be involved in Sheffield City Libraries' "real life" computer development project.

2.0 Aims of Study Circles

2.1 The theory of study circles is that they can enable users of computer systems to take part in systems development and gain some control over the process of change. They can look at existing shortcomings, address issues of power inequalities and create ways for clerical staff to increase confidence and to develop the range and scope of their work.

2.2 A study circle was established in Sheffield City Libraries with exclusively non-professional membership because it was recognised that non-professional staff use computer equipment most and yet have few or no opportunities to take part in planning discussions. The study circle's membership was drawn from the Central Library because of the range of new technology experience gained in the various Central Library sections and the desirability of establishing links and exchanges of experiences.

2.3 Achievement of aims

Although there was initial confusion as to what "Human Centred Office Systems" meant (!), the Group members unanimously feel that the Study Circle has given:

- the opportunity to have a say
- the chance to learn more about computers
- a clearer insight into what the priorities might need to be for a new system
- an opportunity to see the links between library sections, the Computer Room and the Computer Services and Data Prep. sections in the Town Hall
- a chance to break down the jargon of computing

But most important the Study Circle has contributed to giving members greater confidence and a desire to contribute to further deliberations on a new system.

3.0 What the group did

3.1 The group met seven times and covered the following:

- a "get to know you" session where pairs interviewed each other about their work and reported back to the whole group.
- a brainstorming session on current use of and problems with new technology
- each group member did some research on a current Sheffield City Libraries new technology application and reported to the whole group. Topics covered included SHEAF, the DS system in CLL, the computerisation of the Drama Catalogue, the development of On-Line services in CST.
- a visit to Coventry Central Library to see their CLSI integrated system at work.
- an "any questions" session with two computer scientists from the Polytechnic covering basic computing, data storage, Data Base Management Systems and computer jargon.
- a further piece of "homework" was carried out with study circle members researching and reporting on data capture methods, data storage and health and safety issues.
- a visit to the Central Library Computer Room and Computer Services in the Town Hall.
- the final session was devoted to reviewing the work of the group and planning this report.

3.2 The most useful aspect was considered to be the visit to Coventry. This offered an opportunity to see an up to date integrated system running. It also gave a rare chance to see another authority's way of working. Also useful and challenging was the research carried out by the group members. This was confidence building and also gave insight into how particular computer applications were developed. The session with the computer "experts" was thought to have been handled well. Group members felt that they could ask "silly questions" and, although some responses still felt high-powered, the information gained was very practical. The internal visits helped to reveal how everything links up from library sections to the Computer Room to the Town Hall. It was felt that this information had been missing and that most staff are unable to visualise how everything fits together. Whilst at Computer Services group members were particularly alarmed to hear of the short life span of very expensive equipment and wondered what implications this might have for Libraries.

4.0 Current use/role of new technology

4.1 Current and past experiences with new technology applications in Sheffield City Libraries have not been happy ones. Group members are particularly unhappy about the catalogue in which there is little confidence. This lack of confidence affects relationships with users. It was felt that there was not enough training in the use of the T.P. service and nor was there enough time to train the public in the use of the fiche. There exists a feeling of alienation from the T.P. on-line facility which regularly goes down and is dependent on "unseen" staff in the Town Hall. It was recently

discovered that the Saturday afternoon service, considered essential by library staff, was only available through Town Hall staff goodwill in doing overtime. On at least one occasion that goodwill has not been there. The fact that the terminals used for the T.P. service could also make use of word processing and other facilities had not been told to many staff who feel they find these things out by accident. All in all the development and implementation of the computerised catalogue encapsulates all that study circle members fear could go wrong with new technology applications.

4.2 The circulation control system also has its problems. Lack of training in the use of DS has led to inconsistencies between Central and the community libraries - "we made things up and told other branches what to do" was one alarming comment about the use of printouts. Staff also experienced communication problems with the computer technicians. However, in CLL at least, the "speed and space" advantages of a computerised system over a manual system were undoubted.

5.0 Staff involvement to date

5.1 There exists a feeling of complete alienation by group members from previous discussions on systems or application design. Neither the old I.T. PDG nor the On-line user group had any meaning for non-professional staff. For some this state of affairs exists in relation to all proposals for change, not just new technology. The experience of involvement in decision making varied from section to section. In some cases staff are told about developments but the decision making process is very inefficient and the involvement loses its impact; in another, good discussion is inhibited because criticisms are taken personally.

5.2 The study circle does have suggestions for improvement. In particular memos cannot be relied upon to reach everyone. Invitations to participate in Policy Groups or other initiatives should be made verbally wherever possible. Alternatively memos and letters should specifically invite the involvement of non-professional staff where that is required. Otherwise it tends to be assumed that the invitation to participate is addressed to section heads only. The cooperation of section heads is considered essential both in terms of communicating information and facilitating involvement. Further suggestions for improving non-professional involvement in the system design and development process are considered in Section 7 below.

6.0 Towards an integrated system

6.1 "Hold on a minute - do we want one?" If there is to be genuine involvement in developing a new system it is important that management refrain from preempting too many decisions. It may be that the best solution for Sheffield City Libraries is something other than a complete integrated system and those who are to be involved in the planning process need to have the space to make the right decision. The Study Circle had a number of discussions about the problems and possibilities of a new system. The group's preliminary thoughts are outlined below.

6.2 It needs to be accepted that there will be conflicting priorities amongst sections. An obvious example is the

contrast between the needs of CLL, the busiest lending service point in the country, and our numerous smaller branches. In Central a fast response time is critical and may be achieved at the expense of the attractive new features (eg checks on overborrowing). And yet it is the new features which may be the only attraction for community libraries who don't need the computing power required by CLL.

6.3 The group feels that it must be accepted that routine work will not be automated away. Automated systems produce their own clerical routines and data always needs to be manually input.

6.4 The question of self-service borrowing had been raised and was discussed by the group. Whilst the notion of abandoning the important relationships which develop between staff and users at the point of issue or discharge was abhorrent, the prospect of removing the "horror" of working on CLL's exit terminal was welcomed. Again the different priorities experienced by different sections becomes relevant.

6.5 Greater public access to information is to be welcomed but training and help is needed. Group members were not impressed by Coventry's On-Line Public Access Catalogue. The contact that users have with skilled library staff is precious and should be retained

6.6 Any new system should support staff, not replace staff!

6.7 The group acknowledges that there is need for change and improvement but we don't want to replace one set of disadvantages with another! In particular the group felt that having only seen one live system working (Coventry) more time and information is required. The question of whether an integrated system can be justified, especially in cost terms, still needs to be addressed.

6.8 The discussion/design process will have to address questions relating to the quality of jobs and the service provided, some directly technology related, others not. This must be an essential ingredient.

6.9 Finally we raise the question - do computers feel alien because we're not familiar with them or is it that computers, by definition, centralise and take away control? On-line access may appear to give greater control but because the results of the work is "invisible", computer users still feel alienated from their work.

7.0 Who should be involved in the planning/design process?

7.1 The group were committed to the idea that everyone should be involved but not all in the same way. One possible structure may be to have a Forum to include representatives from all sections and from all types and levels of work. There ought to be a heavy input from those doing "front-line" work. In addition there could be a Core drawn from the forum but small enough (8-10 people) to meet frequently and do detailed work. Core and forum members would be responsible to report back to other staff and to feed in their ideas.

7.2 How staff get involved is crucial. The group felt that non-professional staff should receive "preparation" through involvement in a study circle. Interested individuals could be recruited through personal contact and it is important to

avoid "token" involvement. Members of the core may need to be seconded although this should not be full time to avoid losing touch with colleagues, and non-professional staff may need continued support to avoid them being "worn down" by more experienced (DMT) members. A "one person, one vote" system may help to retain the status of non-professional forum or core members.

8.0 More study circles

8.1 The group felt that the organisation of more study circles now would lay the basis for more informed staff involvement later. Interest in study circles could be generated by personal visits and members of the current group would be enthusiastic to help with the process of recruitment. Group members would also be keen to help coordinate and facilitate any future study circles.

8.2 Feelings were mixed as to who should be in future study circles. The group felt that women only groups could not be justified but that men frequently do dominate meetings. It was unanimous that section heads should be excluded but that "junior professionals" may find the process useful. It was agreed however that it was non-professional staff who lacked the opportunity to gain confidence in talking about new technology and the chance to be involved in decision making.

9.0 Relationship with trade union

9.1 It was acknowledged that a number of issues that might be considered in the development and design process would be of interest to the trade unions. The group recognised that formal agreements on handling change already existed. However it was felt that union advice and consultation with shop stewards would be an essential ingredient whilst needing to ensure that things don't get bogged down. Regular two way reporting between staff involved in the development/design process and the trade unions would help.

10.0 Immediate proposals

10.1 It is proposed that all visits and contacts with suppliers and other library authorities should involve more people especially those who don't normally get such an opportunity and yet will be heavy users of any new system.

10.2 We suggest that it could be useful to produce a newsletter to cover developments in our bid for funding, dealings with suppliers, activities of study circles and so on. This will be particularly useful as time goes on and more people are involved in the design/development process.

10.3 Finally we would like to propose that members of this Study Circle be involved in the next stage! The group generated considerable enthusiasm which we feel ought not to dissipate. Involvement could cover recruiting for and coordinating future Study Circles as well as taking part in any discussions, visits and so on that management may organise.

September 1987.

APPENDIX F

Sheffield City Polytechnic

LIBRARIES RESEARCH PROJECT

Study Circle 3 - Summary of Issues

The group discussed a number of questions and summarised the main points that had emerged during the course of the Study Circle.

1. The most important requirements of the new system:

- reliability
- faster and better response times
- it should be 'on-line', ie. provide access to all information
- it should provide immediate borrower information (eg. on fines, etc.)
- it should provide instant access to book and borrower details
- records should be completely accurate
- records should be up-to-date
- there should be only one information source on the catalogue
- the system should be consistent throughout the library service
- there should be a reliable back-up system.

2. Most frustrating things about the current system:

- no check that records have been accepted (BS)
- slow response times (BS)
- system breaks down for long periods (BS)
- system isn't 'on-line'
- lack of fall-back if system breaks down
- delays in providing basic information to the public
- makes assistants feel they can't provide a good service to the public
- totally inadequate catalogue, ie.:
 - it's in different 'bits'
 - it's inconsistent
 - difficult for the public to understand, so staff spend a lot of time explaining things
 - it's not up-to-date
 - it's inaccurate and unreliable
 - no ST locations
 - records are incomplete
 - no title file on fiche
- no communication between systems
- small branches are dependent on other branches for access to the system.

3. Most crucial issue concerning the implementation of the new system:

- better training for everybody

- no 'do-it-yourself' training
- need for experienced trainers who can communicate with staff
- comprehensive training
- training should be updated by means of refresher courses, etc.
- there should be on-going access to expertise, re-training and maintenance
- more staff involvement in the choice of the system
- views expressed in the Study Circles should be taken into account
- there should be better communication between management and staff about what is happening
- public contact and information-provision should be planned better
- the new system should be introduced over as short a timescale as possible.

4. What departmental management should do:

- enable all staff to get involved
- take notice of what the Study Circles are saying
- take account of all library assistants' ideas
- respect library assistants and recognise the value of their contribution
- make information to staff more accessible
- give staff more say in all new policies
- provide good training
- communicate!

5. What the trade union should do:

- don't make waves just for the sake of it
- engage in better/real consultation with all the members
- represent the staff views as they really are
- listen to what the members are saying
- help library assistants to put their views to management
- use the power of the union to represent library assistants.

6. What library assistants should do:

- get more involved
- recognise that the new system will affect you, so take the opportunity to have your say
- your opinions are important so don't be afraid to express them
- this concerns you!

7. Main lessons from the visit to the 'on-line' library

- realised how well a system can work
- realised what we're missing
- saw how the system all fits together
- learned about available technology
- realised how library assistants' jobs can be made easier and people can feel happier

- saw some pitfalls at having so much information available
- wondered how well the system would cope with such a busy library as Sheffield.

8. Benefits of attending the Study Circle meetings

- learning about other sections
- looking at different computer systems
- thinking about the best system for the department
- being able to learn about the problems of other departments
- learning about common problems
- being able to share concerns with other people
- feeling less isolated and more involved
- learning about how the system works
- being able to discuss ideas with other people
- realised how badly informed we are about the rest of the system.

APPENDIX G.

VISIT TO LOCAL STUDIES DEPARTMENT
LANCASHIRE COUNTY LIBRARIES HEADQUARTERS, PRESTON, 24.5.89.

Background to computerisation

Before 1974 the local Studies 'area' in Lancashire Libraries was not very strong. Since then much effort has been put into pulling the districts together.

They were not really consulted about their needs, and it is only by their own efforts that their views have been considered. Local Studies took very much a second place to the rest of the library system and this was not exactly ideal. To a large extent they had to fit in with what the circulation side of the system decided. The abilities of the system now are good so it has offered them an improvement.

At the time of their first computerisation they set up a working group of Local Studies Librarians who decided in favour of computerisation for the following reasons:

- a) no one would do their cataloguing if they stayed out of the new system
- b) it would be foolish not to use the potential of this system which they see as quite advanced technology.

Computerisation

In order to identify Local Studies material on the catalogue for searching it was necessary to have two class no's. side by side. (I understand this is due to the production of their fiché catalogue). Cataloguers were not prepared to let them have two different dewey no's. next to each other. This led to the development of a separate classification scheme devised for their Local Studies material. It allows them to use Local Studies material as a separate data base, and, while access to it is still available at other service points, search only their stock on line.

The classification scheme was devised by Diana Winterbottom, who is the Local Studies County Librarian and was written in two months!

Lancashire's initial computer system was ALS. It did not do what it was supposed to and never enabled them to do live searches, a facility they now feel strongly is essential. Only new Local Studies stock was added in most cases through out the county. After 10 years it was obviously no use and never would be. They reverted to a card catalogue. This was constructed from the computer input forms (fortunately not destroyed) for all material added to stock since 1974. In many cases there was no catalogue before this date.

When a new system was proposed in 1982 it was again designed primarily for the circulation stock. Local Studies were able to have some influence though by this stage. (Strong emphasis was laid on the good relationship between the local Studies Department and the Cataloguing Department.) On line access to the catalogue was always designed to be by class mark. Their classification scheme was 'published' in book form

with the intention that the public could use it easily, and a copy be placed next to each VDU. They are not convinced that key words represent the best means of getting at information via on line searches. In their system strings of class marks are searched instead. Only material indexed under the class mark/subject requested will be retrieved through an on line search. One of the arguments for this system is that it reduces the number of digits to key in allowing a greater number of subjects to be indexed. The longest single subject would be 10 digits: 4 numbers, and then characters to represent a place. References to places were decided using a 6 inch map divided into previously recognised districts. The scheme is said to be efficient and has few problems but we felt that it had been designed very specifically for that local area and would be inappropriate for use elsewhere. It is similar to the scheme in use for our picture collection. Where possible it was designed to lead to and from related subjects to enable effective 'browsing' within the catalogue. Place codes for villages or towns next to each other were also given related codes. The worst thing is probably the string of 'indexed' classification marks at the top of each catalogue entry which could be confusing. We did not find the staff screens very clear and while we accept that this was partly that we were not used to the system the general layout of the public screens was much better. Unfortunately the public do not have access to Local Studies material on line yet, but should do very soon.

The first class mark in the string appeared to be the shelf mark, and all subsequent marks were indexed items. Within the next field, author/title; subject headings for the indexed items were listed. It was immediately clear that the material was not as fully indexed as ours, ie no page numbers were included although we were told it was possible to include them. Upto 50 items could be indexed within one publication.

Various codes had to be entered within various fields at the top of the screen to 'bring up' the screens relevant to that title. It seemed very complex, but to some extent it was possibly just a matter of knowing the codes. Several 'screens' could relate to one item. In some cases only part of the information changed, the details of the material remaining on the screen. It was possible to find out barcode, location, whether on loan and to whom, if any one owed fines on that title, how many copies of a title and their locations and much more. On one screen only part of the entry appeared. This was indicated by a > at the end of the line to show that the line continued off the screen. The entry of a code brought the full details onto the screen. We did not like this feature. All the usual cataloguing information was also available, but it was clear that not all fields had to be filled.

We discussed searching by key words. Diana Winterbottom admitted that she was bias to some extent against them but agreed that they could be entered into the class field as subject headings to indexed items instead of class marks. They felt the main argument against this was that it took up too much computer space. They felt that it may mean some related

information was missed. A key word package is reported to be available for this system now. To be really effective it would have to pick up key words from titles, subjects and indexed notes.

At present no ephemera, newspaper cuttings or microfilms were included but it was agreed that entries could be formulated to indicate that material was available on certain subjects without indexing individual articles in every case. Maps are not included either, and it was felt that an entry to individual sheets would have limited usefulness. It would be more useful to index them by place and date, giving details of what relevant maps were available. At present journals are not included but it is intended that they should be, although full analytical entries were not envisaged. We would have to index these in the same way as a book.

It is possible to get access to non county library catalogues through the system although we were not told which, and the Lancashire catalogue is available on line outside the county system.

Inputting Information

After classification/indexing the materials were passed to cataloguers who input the details onto the cataloguing screen. All the staff in the cataloguing department were professionals, and although there had previously been clerical staff there was a strong feeling that this work should be done by qualified staff. The number of posts within the cataloguing department had been reduced on computerisation and the clerical staff moved across to the acquisitions section.

Each morning a printout of all items catalogued and input the previous day was automatically produced. It did not include items that had been amended/edited. The printout was checked to ensure no errors had occurred. The problems that did occur were usually due to either unauthorised access to the cataloguing screen, or mistakes made by temporary typists who were editing/inputting details in district libraries. As these amendments were not automatically checked mistakes were not discovered for some time. Part of the information available about each title on the normal catalogue screen was the date it had last been input and edited. Observant staff had spotted discrepancies in these dates which had enabled some mistakes to be rectified but this situation was far from ideal. Unauthorised access could be traced to when, where and at what time. Normally access is limited to the fields of the catalogue that staff are trained for/need to use. This level is governed by a personal bar code number.

Some inputting time has been cut down by inputting only volume numbers and their publication details for materials which is published every year.

Most stock is purchased on an approvals system which is input by cataloguers as it arrives to enable orders to be placed directly onto the computer at 'book selection'. The details do not appear on the main catalogue, we understand,

until an order has been placed. At this stage the catalogue entry is limited and will be edited by cataloguers when it has been classified before it can be searched on line. The details of material are available on the catalogue as soon as the cataloguers have input them, they do not have to wait for the catalogue to be updated each day.

All the stock also has a bar code, even when it is not intended to be issued. They found this very useful ie it was easy to get the details of a book up on the screen by penning it, items could be issued to binding etc.

The different types of material were identified by a prefix to the bar code as ours are now. This was mainly for statistical purposes we were told.

Back up

To begin with there was a 'pecking order' for use of the computer time, the reference catalogue appeared to be low on the list. To us it seemed very slow at certain times. In Local Studies they said they did not find this a problem but they were not open to the public at HQ, and we were sure we would find response times inadequate. A terminal could be tied up for a considerable time with a search, and some times access was restricted. This situation would they admitted be improved by a 'larger' system and it seems that this low computer capacity had been a controversial point. A dispute between GEAC and themselves had only recently been resolved. This involved the addition of more terminals to the system and it seems that they had been incorrectly advised on the 'size' of the system when it was first installed. They were still keen to obtain more terminals for staff use before on line searching was made available for the public. We felt that this was an important point because it will be essential for our sections to have sufficient terminals for both staff and public use from the start. Better response times would also be required to provide a service.

The system does have 'hic ups' from time to time we were told. These seemed to be connected with the machinery rather than the programmes though.

If anything does go wrong the computer services section is the first source of assistance. If they cannot deal with the problem GEAC operate a 'help desk' and they can show up the appropriate information on their own screens to discover what the problem is and offer assistance. If they are unable to help in this way they send an engineer usually within a few hours.

There is also a staff manual which has been written by computer services, but staff have added to this within the Local studies section.

If the system 'goes down' author/title fiché is the only back up catalogue. Any issues are recorded on micro computers and have to be transmitted when the system is working again.

During ~~the~~ ~~in~~ this situation many of the functions of the system are not available. No portable units were mentioned.

Training

GEAC did have a contractual responsibility for some training. They sent a member of staff to spend 2-3 days at each service point as the computer went into use. They also left some demonstration equipment ~~with~~ at library headquarters for about a year before the system was installed officially. This enabled the cataloguers particularly to become familiar with it well in advance. It is unlikely that any clerical staff had access to this equipment though. Computer services now held responsibility for training.

They felt that staff have had opportunity to express any dissatisfaction they may have felt with the training they have been given, and no bad reactions to computerisation have been expressed.

Job Design

It was interesting that prior to computerisation no one seemed to have felt that dramatic changes would take place in their jobs. The staff we spoke to were surprised by questions that related to this. They appear to have given little if any consideration to lighting, desks, window blinds, etc and it was clear that improvements could have been made if they had. They were also surprised that we felt it necessary to restrict the hours spent at a terminal, and could remember only one instance when someone had refused to use a VDU on health grounds.

Picture Collection

Preston Local Studies Department has an extensive picture collection estimated at 100,000 and distributed throughout the system in area branches. Although most of the material held by the library has been computerised for some time it was decided at the onset that the picture collection should not be included in the scheme. Preston felt very strongly that it would not be worth the enormous task of indexing the picture collection until a system incorporating an image data base was developed. The ideal system they felt would be Video Disc and they are hopeful that commercial developments in the field will soon make such a system viable.

The existing system used by Preston should be suitable for the computerisation of Sheffield's picture collection, but ideally a system such as Video Disc enabling the user to see an image would be preferred.

APPENDIX H: DRAFT QUESTIONNAIRE.

INTRODUCTION TO THE QUESTIONNAIRE

This questionnaire has been put together by members of the Computers and People Action Group which consists of: library and information assistants, professional and technical staff, a DMT member and researchers from Sheffield Polytechnic.

We hope the questionnaire includes all the questions that you would want to comment on, but if not there is space in the final section, both for detailed comments and general points.

Questionnaires will be collected for each system which is demonstrated here. Each system will also be assessed in a working situation through the Action Group visiting libraries which are using them. Results from both the visits and demonstrations will then be put together, with help from Sue Robertson and Alan Beevers in the Research section. On the basis of these the Action Group will make a recommendation to DMT as to how closely any one of these systems meets Sheffield Libraries needs.

HOW TO USE THE QUESTIONNAIRE

On the demonstrated system we would like you to use the functions which are most appropriate to the type of work that you currently do in the library. We would like you to do this for 45 minutes to an hour. After this we would like you to complete the questionnaire as described below. While completing the questionnaire you may find it useful to refer back to the system. If you have time to and want to look at other parts of the system which are not directly related to the work that you do then by all means do so.

The questionnaire is divided into six sections:

- 1 General aspects of the system
- 2 Cataloguing and acquisitions
- 3 Circulation control
- 4 Information services
- 5 Systems management
- 6 Final comments

We would like everybody to fill in section 1 and then to take and fill in one of the sections 2 - 5 that deals with the work that you do now, and then everybody to fill in section 6. If you have experience in more than one area of libraries work, and if you have time, you are welcome to fill in additional sections. This procedure may seem a bit formal, however, please remember that it is the system that is being tested and not yourself or your use of it.

Sections 1 and 6 are attached to the personal details sheet, after these instructions.

we would also like you to complete the personal details page that is attached.

The questions are of different types. Some just ask for a yes or a no answer; with these please indicate your answer by either circling the appropriate one or by deleting the inappropriate one. All we need is a clear indication of what your answer is.

Some questions have answers as scales numbered 1 to 5. For example:

How satisfactory are the procedures for issuing a book?

Very
Unsatisfactory

Very
Satisfactory

1-----2-----3-----4-----5

What we would like you to do here is to circle the number which best fits your opinion (answer) on how the system performs on the question asked. So in the above example if you think the system has good and workable procedures for issuing a book then you might circle 4 or 5. However if you were not too impressed with the issuing procedure you might circle 1 or 2. If you think the procedures for book issuing are OK but could be better you might want to circle 3.

Other questions ask for and give space for a comment type answer. What we would like you to do here is to write a short sentence or two.

Since these are demonstration systems they may not have working on them all the functions that are of use to you. Similarly since they will be new to you, you might not have time to use or learn about all the functions that are of use to you in your work. This is fine, we would just like you to fill in as much of the questionnaire that you can. If you are very short of time you might just like to fill in sections 1 and 6 and the personal details sheet.

If you have any problems with using the system and the questionnaire then please ask any members of the Action Group or the library's technicians who are present at the demonstration.

Could you please return the questionnaires to:

Sue Robertson, Research and Development.

PERSONAL DETAILS QUESTIONS

What is your current post?

Which section of the library do you work in e.g. circulation control, cataloguing, information/reference?

What other sections have you worked in?

What is your position e.g. library assistant, professional?

What type of employment is it e.g. are you full-time, part-time, or job share?

How long have you worked in your current post?

How long have you worked in this local authority's libraries department?

How long have you worked in libraries overall?

How long have you been using the current computer system?

Male or female?

DEMONSTRATION GENERAL QUESTIONS

Which system did you see?

USABILITY

10 How easy is it to get information?

Very
Difficult

Very
Easy

1-----2-----3-----4-----5

Have you any further comments

11 Where there are different searching levels how satisfactory are they?

Very
Unsatisfactory

Very
Satisfactory

1-----2-----3-----4-----5

Have you any further comments

142 How adequate are the manuals for the system that staff can refer to if problems occur?

a) Do they seem user friendly? e.g.

Not Very
Friendly

Very
Friendly

1-----2-----3-----4-----5

Have you any further comments

b) How easy are they to read?

Very
Difficult

Very
Easy

1-----2-----3-----4-----5

Have you any further comments

c) How comprehensive?

Not Very
Comprehensive

Very
Comprehensive

1-----2-----3-----4-----5

Have you any further comments

d) How well indexed?

Very
Badly Indexed

Very
Well Indexed

1-----2-----3-----4-----5

Have you any further comments

30 Are the screens clear? - i.e. easy to read?

Very
Unclear

Very
Clear

1-----2-----3-----4-----5

Have you any further comments

31 a) Do you have a choice of screen colours?

Yes No

b) Is screen brightness adjustable?

Yes No

c) Is screen contrast adjustable?

Yes No

Comments

31A Is information presented on the screen in a way which is easy to understand and find?

Very
Difficult

Very
Easy

1-----2-----3-----4-----5

Have you any further comments

38 Do the printers print clearly?

Very
Unclear

Very
Clear

1-----2-----3-----4-----5

Have you any further comments

39 Is the keyboard clearly labelled and easy to understand?

Very
Unclear

Very
Clear

1-----2-----3-----4-----5

Have you any further comments

69 How many screens have to be worked through to achieve details of article\book at a particular service point?
Number:

Is this satisfactory:

Very
Unsatisfactory

Very
Satisfactory

1-----2-----3-----4-----5

Have you any further comments

70 Do complex codes have to be entered to change screens?

Yes No

Is this satisfactory?

Very
Unsatisfactory

Very
Satisfactory

1-----2-----3-----4-----5

Have you any further comments

HEALTH AND SAFETY

16 Are the screens comfortable to use? - i.e. glare, feeling of eye strain?

Very
Uncomfortable

Very
Comfortable

1-----2-----3-----4-----5

Have you any further comments

37 Are the printers noisy?

Not Very
Quiet

Very
Quiet

1-----2-----3-----4-----5

Have you any further comments

202 Is the keyboard comfortable to use?

Very
Uncomfortable

Very
Comfortable

1-----2-----3-----4-----5

Have you any further comments

FINAL SECTION

Which system did you see?

1 What did you like most about this system?

2 What did you find most unsatisfactory or off-putting about this system?

3 What are your general impressions and views about using this system?

4 Are there any comments you want to make about this questionnaire:

issues that have been left out?

areas that were not clear enough?

how easy has it been to complete?

Have you any general comments on the usability of the system?

ref demgen.jan