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Office systems development and gender: Implications for computer supported co-operative work

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Abstract

We present new UK research (1987-90) in the area of gender and office information systems design. Our paper will contribute to the CSCW debate in two areas. Methodology, where we use our case-study experiences to reflect upon the traditional computing approaches to office systems design. Secondly, participatory design, through our active involvement in the work-place we consider a gender perspective on obstacles and opportunities for involvement in the design process. We open by briefly discussing the range of current UK office systems design methods, contrasting these with more innovative approaches developed in Europe. Secondly we focus upon clerical work as a major area of women's employment concentrating on the relationship between technical and organisational aspects of systems development. In section three we present the outcome of our own case-study research. We worked in collaboration with staff in a large public library, where management envisaged the acquisition of a new integrated system to link previously discrete services. Our aim was to develop techniques and strategies through which women staff could intervene in the evaluation of systems and suppliers. In conclusion, we identify a number of factors within public sector office work, which affect opportunities for a proactive role for clerical workers and their trade unions, in the design and implementation of office information systems.

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Introduction - links with concerns within CSCW

In his introduction to a special issue of the international journal of man-machine studies S Greenberg (1991) provides a loose categorisation of concerns within CSCW. We feel our work can contribute to the debate under two of these headings. Firstly, methodology, in section one we take a theoretical look at approaches to office systems development, examining both the current dominant techniques and new, more cooperative ways. Secondly, participatory design, we adopt a gender-perspective on this concern in our section on clerical work and information technology providing detailed examples from our case-study work.

Another of the main issues for CSCW is the bringing of technology into particular organisational contexts and the need to analyse the socio-political dimensions associated with the development of information systems in the workplace (Bannon, Bjorn Andersen, Due-Thompson 1988). We address this issue in section 2.1. technology and organisation: links and definitions.

A theme of cooperative work underlies our chosen case-study. Integrated library management systems focus on a shared common database and there is considerable emphasis on mechanisms for improved communications both formal (through designed procedures) and informal (through the presence of electronic mail). Finally the development of large integrated software systems to support work within the office environment is increasingly (within the U.K.) being achieved through the acquisition of highly parameterisable packages. Hence approaches and techniques that help to evaluate such systems will be intensifying in importance, our case- study (section 3.2) provides some interesting ideas in this area.

1. Gender, computerisation and 'user relations'

The phase of computerisation since the 1980's has been described as one dominated by a concern with 'user relations'. (Friedman and Cornford, 1989). In contrast, Friedman and Cornford identify two earlier phases in the history of computerisation: the first characterised by hardware constraints, and the second by difficulties with software production.

In the UK at least, women continue to be defined largely as the end-users or operators of computerised systems, even where their work may in practice include an increasing range of systems-related or technical aspects. Women still occupy a relatively marginal position both within computing, and at the senior management levels where strategic decisions on information technology are taken. Therefore we need to know how far this suggested shift in focus within computing, away from hardware and software constraints and towards user relations, may present women with changing issues and opportunities. It is possible, for instance, to envisage the creation of jobs which combine clerical and technical elements; this

could open up new forms of access to computing, and to better-paid work, for women office workers (see for instance Hales, 1989). Such developments could build on, and enhance, the informal patterns of cooperation and communication which are an integral but unrecognised part of many clerical jobs (Olerup et al, 1985; Green et al, 1991). However, to date there has been little exploration of these possibilities, in the UK context. A brief examination of the systems development literature shows that in the UK, many systems development methodologies and approaches now claim to involve 'the user'. But in many cases, this appears to be an ambiguous response to the large number of failed or inadequate computerised systems - not a significant move towards empowering users.

'Structured' systems analysis and design methodologies, for instance, are widely used, especially in the public sector. They claim to provide 'a lot of interaction with the user' (LBMS, 1986). However, in practice the emphasis here is only on the manager as user; and priority is given to analysing formal data flows and relationships, not organisational processes, or 'user' interests in any broad sense. These approaches have been criticised for implying a functionalist and deterministic model of social relations: structure and consensus are taken as the norm, while change and conflict or inequality within the workplace are largely ignored. Our own previous research has illustrated the ways in which this specifically undermines progressive initiatives on equal opportunities and job design, (Green et al, forthcoming). It is clear that these dominant ideas and practices are not compatible with the notion of cooperative work nor the participatory methods required to develop appropriate support systems.

Other methodologies do address the issue of user relations in greater depth. Both the Socio-Technical Systems and Soft Systems approaches are examples (Mumford, 1983; Checkland, 1981). Neither, however, deals adequately with issues of power and inequality within the workplace. Mumford, for instance, suggests that the goals of increased job satisfaction and increased productivity can be pursued largely without conflict. Checkland does identify the existence of different 'stakeholders' or sets of interests within an organisation but his response is a liberal and idealist one, envisaging the resolution of differences through discussion among equals. Neither approach puts forward thorough analyses of conflict and inequality within organisations, or practical approaches through which the least powerful systems users could address these.

In contrast, scope for more radical initiatives has been shown both by the Scandinavian 'Collective Resource' approach, and by UK initiatives in the area of 'human-centred' systems design. (Ehn, 1988, Gill, 1990). These initiatives have sought to develop computer systems which protect or enhance the skills of, and exercise of control and discretion by, workers who conform to the ideal underlying Braverman's original 'deskilling' thesis: male craft workers, who possess not only skilled status, but also a high degree of union organisation. Within the field of CSCW there are particular instances of cooperative approaches to systems development see for example Bodker and Gronbek (1991). These approaches

have related workplace experience to a wider concern with trade union and democratic rights: that is, within the terms of the relations between capital and labour. However, neither the choice of which groups of workers to involve, nor the analyses of skill or of workplace relations, reflect any concern with women workers or with broader gender issues.

First funded by two UK Research Councils in 1984, our own research project has focussed on a major area of women's employment: office work, which has also been the subject of much intense and contradictory speculation, in relation to automation.

The limitations of existing human-centred design perspectives, with the emphasis on class rather than gender relations, soon became apparent. In connection with technology in particular, feminist analyses have revealed the enduring nature of gender divisions. These are not explained by women's real or assumed domestic responsibilities; and far from withering away, gender inequalities continue to be reproduced through distinct material and ideological practices, within the workplace itself. But these patterns have become visible largely through feminist perspectives. Social theory, however radical, has failed to address such issues. (Cockburn, 1985).

In connection with systems design, feminist initiatives have begun to challenge the gender-blindness which has characterised both conventional methodologies and the range of more radical, interdisciplinary projects. Systems development methodologies tend to reproduce the gendered dichotomies embedded in Western natural science traditions: categories such as 'hard' and 'soft', thought and emotion, objective and subjective, are treated as opposed rather than interdependent. Greater status is accorded to 'hard', quantifiable data than to workers' own accounts of priorities or procedures. (Greenbaum 1987). Research such as Greenbaum's offers a potentially important link between feminist perspectives on epistemology and the 'human-centred systems' emphasis on human diversity and on the interdependence of subjective and objective knowledge (Gill, 1990). In Europe and in Scandinavia in particular, research has begun to explore innovative systems design approaches, within which women's skills and working knowledge can become central. (Olerup et al, 1985; Tijdens et al, 1989).

Drawing on these perspectives, our own research initially analysed a range of conventional approaches to the design of office information systems. We then moved on to assess the scope for women clerical workers to intervene in processes of office systems development, in the context of the UK public sector. In section two we turn to a consideration of the themes addressed in this recent research and in section three we briefly discuss some of the techniques adopted during our case-study.

2. Clerical work and information technology:

Clearly, IT can be introduced into office work as part of a wider restructuring which does result in job losses, and in worsening working conditions. However, neither the 'optimistic' forecasts of the early 1980s (the 'paperless office'), nor the 'pessimistic' ones (large-scale job losses) have been fulfilled. Both may be seen as implying a degree of technological determinism, as well as over-estimating the homogeneity and coherence of management strategies. Office work remains a major area of employment for women and recent research indicates that the technical and organisational skills, the range of tasks and the relative stability which characterise many clerical jobs, also make it a primary rather than a secondary labour market for women.

Surveys and case-studies also illustrate the complexity of women clerical workers' experience of computerisation. In connection with typing and word-processing, Webster (1989) demonstrates how strongly pre-existing forms of work organisation shape and limit office applications of IT, resulting for instance in substantial under-use of word processing technology. Women report a range of positive and negative experiences, regarding office computerisation: increased job satisfaction, and the development of some new skills and opportunities; but also increased stress, intensification of work, health and safety problems, and a general absence either of consultation or of adequate training, (Liff, 1990). In the UK, very little research exists at all on the subject of clerical workers' formal or informal participation in processes of systems planning and design, as distinct from implementation.

2.1. Technology and organisation: links and definitions:

In much systems development literature, 'social' or 'organisational' factors remain ambiguous. The terms may be used to refer to individual user needs, to organisational processes, or to the ways in which these reflect wider social and economic relations. In contrast, technological aspects in systems development may appear to be fixed or well-defined and apparently neutral ground. This leaves intact the 'hard'/'technical' versus 'soft'/'non-technical' dichotomy referred to above (Greenbaum op.cit.). In contrast, a growing body of social science research points to complexity and interdependence, in the relationship between technology and organisation:

"Technologies are patterned by, and in turn, condition the development of organisations... the boundary between the two is obviously far from clear."

(Williams, 1990, p.12-13)

From a gender perspective, we need to explore how this interdependence may be manifest in specific situations. Can systems development techniques be adopted, through which women workers may influence the ways in which

organisational and technical factors are defined and negotiated? In the next section we investigate this issue within the context of our case- study.

3. Case-study research

The case-study organisation is 'City Libraries', the public library department of a major, Northern City Council in the UK. With a workforce of 32,000, the City Council is by far the largest local employer. Most manual, administrative and clerical staff are women, concentrated in the lower grades. Within City Libraries, virtually all the 400 staff on clerical, 'library assistant' grades are women; but men outnumber women at senior professional and management levels.

Within the organisation, management and staff share the view that previous phases of library automation were 'disastrous'. When our case-study began, in 1986, a piecemeal, technology led process of computerisation had taken place over a ten year period. However staff found that the delays associated with a batch-processed, mainframe-based system made these facilities less satisfactory than previous manual systems. There was, therefore, a common desire to find a new approach to further phases of computerisation. At the same time, City libraries as a whole had moved towards an outward- looking, active and community-oriented model of library provision. As part of this, management accepted a trade union based equal opportunities proposal to expand the pay and career opportunities for library assistants on clerical grades. In addition to dealing with routine tasks - issuing, shelving and repairing books, processing catalogue and borrower records - many library assistants deal with complex public enquiries. Through new grading arrangements, management began to acknowledge and reward this overlap between professional and non-professional or clerical roles.

In 1986, management had begun to discuss the need for a new computerised library system, probably to be based on one of the integrated library systems then becoming available from a range of suppliers. However, the management team had not been able to complete a new systems specification, nor to develop proposals for staff involvement. They therefore welcomed our research approach. Following discussions both with management and the trade union branch, we were able to reach an agreement to collaborate, based on three principles. Firstly, a view of library automation as enhancing jobs and services, not replacing staff; secondly, a view of the systems planning and development processes as embracing both technical and organisational aspects; and thirdly, a commitment to exploring new forms of consultation or involvement for library assistants on clerical grades, in connection with computerisation. The notion of the 'quality of service' was an important unifying one in this context and helped to provide some semblance of cooperative work. That is the workers in different sections and at varying levels in the hierarchy saw themselves cooperating to provide an improved quality of service to their community-based clients. The new computer system was generally regarded as providing a significant means to this end.

Responsibility for managing this process remained with City Libraries' management team. Our research role included facilitating meetings and other activities, as well as analysing outcomes on the basis of observation and of in-depth interviews. Below we discuss major aspects of this collaborative work:

3.1. Planning for a New System: Women's Study Circles

Technical and organisational issues and boundaries.

Within City Libraries and in the City Council more generally, a large gap exists between policies on Information Technology and organisational policies, including those on gender and equal opportunities. The former tend to be debated in depth by senior staff within the Computer Services Division: people with technical computing skills, who then advise City Councillors. Councillors have tended to lack the background knowledge, and perhaps the political perspective, required in order to broaden the terms of the debate, beyond narrow technical concerns. Equal opportunities policies, on the other hand, have been pursued particularly by women, inside and outside the City Council, with very uneven support at senior levels.

Both management and trade union representatives at City Libraries welcomed our research interest in inviting staff to discuss computerisation. Management, however viewed women library assistants as dominated by their bad experience of current computerisation, and thought them unlikely to respond enthusiastically. This is an interesting instance of the ways in which a 'sympathetic' male view of women, as passive victims of badly-designed (past) technologies, can operate to reproduce the effective marginalisation of women from active intervention in connection with IT. In this context, we organised a series of study circles for women library assistants. We aimed firstly, to invite them to share their experience and their views on computerisation; and secondly, to invite them to put forward specific ideas regarding the selection and implementation of a new system. This study circle process is discussed in detail in Green et al (1991).

3.2. Developing systems evaluation techniques within a mixed design team

Informal Communication versus 'increased efficiency' ?

Study circle reports proposed a design team structure, with members drawn from all levels of the library staff, including library assistants. Reassured by this expression of staff interest, management agreed, and this group was convened in 1988, with the initial brief of completing a specification for a new library system.

Early discussions in the City Libraries Design Team provided some vivid examples of the different experiences and perspectives of the group's members, some of which are related to gendered work experience. At this stage, the group

was preparing a draft specification for the new system. Apparently simple issues often revealed radically different assumptions about how a balance should be struck between making the best use of the latest technical options and facilities, and providing the best service and working conditions. In the following extract from one such discussion, group members are debating whether letters requesting borrowers to return overdue items should be processed centrally or in local branches. As things stand, this is a very sensitive issue for women library assistants, who are often on the receiving end of complaints when borrowers are sent reminders for items already returned, but not processed by the current, batch-supported system. 'CDL', the male professional computer development librarian, is responding to various library assistants ('LA'), who want a distributed system under branch control, rather than a centralised one:

CDL: Why send overdue letters from each service point?

LA: The currency of reminders is important; overdue letters can be a source of friction now.

CDL: 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.

CDL: 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 good quality paper at each service point would cost a lot of money; and paper might run out in branches.

For the women library assistants, the quality of social interaction with library users is the priority; the number of people likely to be upset by late reminders may be 'a small percentage' for the computer development librarian, but it has a large effect on library assistants' day-to-day working relationships. The computer development librarian appears to give this scant consideration; he enthuses about the image of a streamlined, centralised system, and resorts in the end to an incongruous argument - the suggestion that paper may run out, at local branches. As this discussion proceeded, the women library assistants ceased to take part, exchanging exasperated glances. After further discussion, however, their contribution was recorded in the completed specification, in the form of a compromise: a facility for branch staff to over-ride centrally-processed letters quickly and easily.

This extract, then, brings to life some aspects of the gendered dichotomies referred to above. Library assistants' concerns arose in the context of daily routines with 'caring' or 'social' aspects which have historically become defined as 'women's work'. As such, these concerns were very vulnerable to being marginalised, by the assumption that the most sophisticated technical solution was

the obvious one. The stress levels arising from public complaints left no formal, statistical trace, to set against the computer development librarian's references to percentages. This example underlines the general importance of ensuring that 'end-user' concerns - spanning technical and organisational issues - are addressed clearly at the earliest stages of systems development. It also illustrates the pressures and the obstacles faced by junior women staff, in moving towards new forms of cooperative systems planning and design with male technical and professional colleagues. We now turn to a short account of one set of techniques adopted in our case-study: the development of criteria and methods for evaluating existing integrated library systems, by the mixed Design Team.

Developing Systems Evaluation Techniques

Integrated library automation packages are now available from at least eight major suppliers. City Libraries, therefore, did not regard the development of a system 'in-house' as a feasible economic proposition. However, the available systems and suppliers display significant differences; these systems are also designed to operate according to locally set parameters. Selecting a system and a supplier is usually the prerogative of a small number of key senior managers and computing staff, for whom systems suppliers have a repertoire of demonstration modules. Available literature on library automation, in the UK, includes a range of checklists for use in these contexts; however, these are brief, and not adapted for cooperative or in-depth use by a broader range of prospective systems users. In City Libraries, therefore, the Design Team needed both to plan a programme of evaluation events, and to devise a method of recording and analysing staff assessments of the available systems.

In October 1989, outline plans were made for a series of Design Team visits to libraries already using the systems under consideration; in parallel, each supplier was invited to provide an on-site demonstration within City Libraries, extending over at least one week, and open to all library staff to attend. The Design Team began to draft questionnaires to record the assessments made by participants in visits and demonstrations. The women library assistants on the team compiled an initial set of questions; these were then debated, edited and supplemented by the whole group, in a process that extended over a six month period. Increasingly drastic budget cuts, within the City Council as a whole, obliged the Design Team to cut short its planned programme of visits to working library systems; the demonstrations therefore proved to be the main focus of the team's evaluation effort, on the basis of which available systems were shortlisted in December 1990.

How far can the evaluation exercise briefly summarised here be said to have succeeded in making 'technical' and 'organisational' aspects of systems development more readily available for discussion and negotiation, by women clerical users and their professional and technical colleagues and managers? In common with the study circle process referred to above, the evaluation process did open up systems selection and development issues to basic-grade women library staff, in an unprecedented way. Suppliers and end-users met face to face, without

the usual technical or managerial intermediaries. Comparing the different questionnaire sections produced by the Design Team is also instructive: technical or 'systems management' questions - often jargon laden, and requiring translation for most Design Team members - make up about one eighth of the total; the rest are phrased to directly reflect staff and library borrower needs. In the absence of junior women on the Design Team, we would have expected these proportions to have been reversed.

As anticipated, the Design Team did experience difficulties in seeing through the evaluation work. Firstly, drafting the questionnaires proved stressful and time-consuming for the women library assistants, who contributed the initial versions. The Study Circles had established a strong, informal basis for cooperation and mutual support, based on exchange of personal experience and on practical activities. In contrast the Design Team came to base its discussions increasingly on written documents: the draft specification, the questionnaires. That is, the Design Team sometimes appeared to drift back into some of the bureaucratic, inhibiting patterns, characteristic of City Libraries, which the Study Circles had successfully challenged. Draft questions, put forward tentatively by library assistants in good faith, were sometimes torn apart or rejected - with little positive recognition of the effort put into the drafting process. In a mixed- gender, mixed-status forum, this placed considerable strain on the library assistants. On occasion this was deflected with a humorous comment:

"Here I am sitting next to my boss - he gets up and contradicts what I've just said. What am I supposed to do about it?"

(Tina, Clerical Assistant)

Considerable tensions emerged in connection with the detailed organisation of the visits and demonstrations. It also proved impossible to hold the suppliers themselves to the exact demonstration format originally proposed by the Design Team. The latter had proposed that flexible 'hands-on' sessions should make up the larger part of each session. In practice, most suppliers kept to a conventional pattern of talks or lectures, followed by questions and a restricted period of practical work at terminals. This limited the scope of the evaluation questionnaires, in many respects. Clearly, within the confines of a particular market, system suppliers still wield considerable influence in their own right. We found that some suppliers were not sensitive to the concept of cooperative work nor were they keen on dealing with mixed groups of users selected on a non-hierarchical basis. One representative suggested: -

"....once you start introducing democracy into a thing, it opens up the whole thing, and they never decide on specification they'll never decide what they want and it just won't happen".

4. Discussion

The Study Circle process made positive gains for the women concerned at a number of different levels. In particular, their interests as major users of the new

system are now represented. However, although both management and the trade union have ostensibly welcomed this involvement, they are uneasy about the broader implications of changes to the organisation's personnel structure and associated work cultures. At a formal level, all parties have accepted that library assistants are equal members of all the groups involved in the systems development process. But in practice, many of the bureaucratic changes needed to sustain that involvement have been either delayed or not delivered, as promised e.g. provision of stand-by relief to cover the work of the assistants involved in the Design Team. Explanations for this lack of support involve both economic issues, such as resourcing of staff time during a period of cut-backs, and the reluctance of relevant line-managers (mostly male) to release the women from public duties. Both responses, although justified on certain levels, serve to reinforce the status quo and confirm the library assistants' position as low status, women workers, marginalised from decision-making processes. Similarly, the trade union involved is supportive in theory of the women's involvement, but has not found the resources to either follow up the specific issues raised by the women, or change their stance on negotiations with management. The union has found it difficult to recognise that the formal union strategy on new technology is viewed as less relevant by many women library assistants than the study circle and design team processes.

At a broader level, the evaluation work is more difficult to analyse and assess. Mixed gender groups are obviously desirable in theory; in practice they present problems, since gender inequalities have become entrenched in the divisions between professional (including technical) and non-professional jobs (Davies and Rosser, 1985). These tensions are manifest in the relative status of the contributions made by different members of the design team. The technical computer support staff involved in the process are male, and in permanent posts, confident of their abilities as 'experts': overseers of the current system (inadequate though it is) and midwives of the new one. In addition the majority of the professional librarians and senior managers are also male and largely at ease with the technical jargon and associated cultures surrounding IT. In contrast, women library assistants were conscious of tensions and ambiguities surrounding their participation. Day-to-day experience enabled them to make practical contributions, for example to the systems specification, on issues not easily visible to managers or systems designers. However, many of these issues had links with broader areas of library policy, which, as library assistants were very aware, remained the prerogative of senior management. In a period of cutbacks and organisational transition, resources such as training were not readily available to support library assistants in expanding their role. In the library context, key members of the senior management group favour a view of IT as promoting organisational flexibility, enhanced access to information and increased mobility of staff. This informal but powerful view is regarded with suspicion by library assistants, who fear that the new system will be used to justify cuts in staffing. Indeed most recently, some senior managers have begun to refer to the proposed new system as

potentially facilitating substantial job losses which the recent budget crisis has made inevitable. Although previously opposed to the view that computers can or should replace staff, when faced with the problem of implementing budget cuts they struggle with the concept of protecting the library service through prioritising the new system, even though it may be accompanied by a reduction in staffing:

“...if the choice is between having the computer and not having it at all, and if we have it with a slight staff reduction, I think initially that might be acceptable, as a shorter term strategy. And then we would have to review whether or not staffing was right.”

(Chair of Design Team)

The considerable unease with which the woman manager concerned made this comment demonstrates the contradictions experienced by managers, caught between a managerial ideology which prioritises the interests of the organisation and its ‘duty’ to offer a service to customers, and a personal commitment to preserving jobs and job satisfaction.

Although this managerial view implies that the library assistants are justified in being cynical, at another level it captures the effects of a widespread dislocation between IT strategy and equal opportunities policies. Junior clerical workers with few line-management responsibilities are freer to innovate in the area of job design; they have much to gain from linking computerisation with challenges to gendered hierarchies in the work place. Similarly the confusion of senior managers about the potential connections between computerisation, staffing levels, and job satisfaction is intensified by the separation of technical and social/organisational issues characteristic of computer experts’ jargon. Technical and scientific knowledge is commonly viewed as ‘authoritative’ and legitimate (Suchman & Jordan 1989). This knowledge also becomes ‘concrete’ and reassuring when it apparently gives rise to computer hardware. More at risk in times of economic constraint are innovative, ‘soft’ areas such as creative and informal work on job design; this is easily seen as dispensable. This gendered and problematic dichotomy, between technical and organisational factors, contributes to the continuing marginalisation of the interests of the women clerical users of office information systems.

Conclusion

Where the goals of an information system include substantial integrated or cooperative elements then this has particular implications for the way the system should be developed. The chosen methodology must reflect these aspects of cooperation (across functional areas or within the organisational hierarchy) and demands some form of participatory approach. Cooperative aims such as the quality of service provision become paramount in this situation. The required methodology must include techniques which empower the participants and recognise their differences such as gender and status.

At the beginning of this paper, we referred to the suggestion that 'user relations' issues characterise the current phase of computerisation (Friedman and Cornford, op.cit.). Our own case-study data does confirm this suggestion. User relations, and more specifically basic-grade staff involvement and consultation, were the major priority for both management and workforce in the organisation concerned. From the earliest stages of planning and discussion, both perceived 'user-involvement' not only as desirable within a framework of generally progressive employment policies, but also as crucial to the success of a new phase of computerisation. As discussed above, this new phase of computerisation was to be based around the selection and local 'tailoring' of an existing, integrated information system: not around an in-house, one-off process of systems development. This pattern is increasingly common, in the areas of clerical work and other service sector employment for women. It is essential therefore, that we begin to map out the positive and the negative factors influencing women's opportunities for cooperative intervention and improved working conditions in this context.

At a general level, our case-study confirms that the advent of large-scale, integrated information systems increases managerial reliance on the skills and cooperation of 'users' at all levels (Williams op.cit.) and in particular women clerical workers. In our example, managers were prepared to resource an unprecedented level of clerical worker involvement, as they could not envisage the successful development and implementation of a more sophisticated information system without it. Within a public sector context, there is scope to make links between this increased management recognition of clerical skills in relation to information systems development, and broader, prior commitments to facilitating equal opportunities. In this situation, structures such as the study circles and the mixed gender and status 'Design Team' were able to retain a considerable degree of initiative. They established new forms of cooperative decision making; they sustained a focus on both technical and organisational aspects of systems development, and they retained maximum scope for negotiating with systems suppliers over systems features and implementation. However, the case-study also illustrates a range of complex and difficult issues. Paradoxically, close collaboration between women clerical workers and their technical and professional colleagues, mostly male, made more visible the informal patterns of male 'tenure' of IT, for instance the ways in which male computing professionals spontaneously asserted the benefits of a 'state of the art' system, rather than stopping to listen to arguments about staff-client relationships. Challenging this traditional, patriarchal, hierarchy, in which 'the technical' takes precedence, proved intensely difficult and stressful in practice, especially for the women library assistants.

Lastly, it is important to acknowledge the political and economic climate of the case-study: an intensifying crisis in the UK public sector, and the slide into another major economic recession, with the associated threats to employment levels and to hard-won rights and opportunities. Looking ahead to further rounds of central government cutbacks, some managers in City Libraries visualise a

'transformed' public library service, operating perhaps with 30% fewer staff. However, the ground gained through clerical worker involvement in planning for further automation has not been lost. Even in such an unfavourable climate, it is no longer possible for computerisation to be viewed simplistically as a solution to the problem of maintaining service delivery with a drastically-reduced workforce. Through intervention at the systems planning and design stages women clerical workers, and their union representatives are in a stronger position to expose and challenge this assumption, and to negotiate over technical and organisational alternatives.

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