

# Participating Informally: Opportunities and Dilemmas in User-Driven Design

**Martin Beirne**

Dept. of Management Studies  
University of Glasgow  
53-59 Southpark Ave.  
Glasgow G12 8LF, UK  
+44 141 3305661  
M.J.Beirne@mgt.gla.ac.uk

**Harvie Ramsay**

Dept. of Human Resource  
Management  
University of Strathclyde  
Graham Hills Building  
50 Richmond Street  
Glasgow, G1 1XT, UK  
+44 141 5524400

**Androniki Panteli**

Dept. of Management Studies  
University of Glasgow  
53-59 Southpark Ave.  
Glasgow G12 8LF, UK  
+44 141 3305031  
N.Panteli@mgt.gla.ac.uk

## ABSTRACT

This paper draws attention to the hidden influence of human subjectivity and informal patterns of social interaction within the systems development process. Through an extended case analysis, it uncovers a level of activity beneath the surface of structured methodologies and formalised arrangements which can be intense and problematical for the various stakeholders yet crucial in rendering systems viable in the context of use.

By contrast with conventional images of passive, dependent or as yet unenfranchised users, we demonstrate the active agency of grassroots staff in claiming space to assert themselves, taking the initiative and developing their own resources to secure viable systems. Essentially, we offer an account of how two data entry workers breached the terms of their contracts to become de facto designers and programmers, successfully customising applications software that proved functional despite formalised procedures rather than because of them. Though eventually securing the tacit approval of managerial grades, this was a tense and struggle-suffused activity for the individuals concerned. It also adds a significant gender dimension to the capacity to control final outcomes. By revealing the dilemmas they confronted, and relating these to an appreciation of the creative space they levered open, we reflect on the wider significance of this episode for the ideals and project of participatory design.

## Keywords

User-Driven Design, Informality, Empowerment

## INTRODUCTION

User-led innovation is now a familiar rallying cry across the length and breadth of the literature on computing. At root,

it thrives on the belief that a combination of local and generic knowledge is central to successful systems development. Yet there is now a growing appreciation that user-involvement is an intensely political and problematical process, liable to the sort of adversarial and tension-filled relationships that characterise wider forms of labour-management participation in industry and commerce.

In an earlier publication, two of the authors presented empirical research connecting established authority relations within organisations to complex structures of user-involvement in systems development projects (Beirne and Ramsay 1992). Counteracting the attractive imagery of broadly-based, unambiguous user empowerment, our findings signalled the reproduction of hierarchical relationships and the lingering defence of decision-making prerogatives by managerial grades in both operational and information systems (IS) spheres of influence. There was strong evidence that involvement schemes tend to be highly fragmented in practice, with extensive filtering and tiering of user input along conventional lines of authority.

Our case studies confirmed that users were selectively incorporated into formal design processes depending upon their position and status, rather than their knowledge per se. What emerged was a multi-team pattern of involvement, with a clustering of users from similar grades and levels in the employment ladder. The time that each group gave to systems development, the stage of the lifecycle at which their involvement occurred, and the influence they exerted, all varied with their decision making power within the enterprise. For junior managerial and shopfloor staff the overall result was a restricted and controlled experience, with IS professionals acting as gatekeepers on their input and in effect trying to 'pick their brains' during systems analysis, or even to use formal participation merely as a means of reducing resistance at the implementation stage.

This evidence highlights the strength of attachment to minimum interaction models of 'user-participation', certainly in Central Scotland (and we have no grounds to suppose that Scotland is unusual in this respect). A common perception is that involvement is basically a repair

In *PDC'96 Proceedings of the Participatory Design Conference*. J. Blomberg, F. Kensing, and E.A. Dykstra-Erickson (Eds.). Cambridge, MA USA, 13-15 November 1996. Computer Professionals for Social Responsibility, P.O. Box 717, Palo Alto CA 94302-0717 USA, cpsr@cpsr.org.

kit that can be introduced to cover the blind spots and deal with the negative effects that follow from a reliance on structured design methodologies. It has little to do with conceding power and influence or democratising organisational structures. The main purpose is to elicit the commitment and tap-in to the local knowledge of ground floor users, even if this means limiting the contribution that knowledgeable organisation members can make to technological innovation. The reproduction of established authority systems in formal procedures certainly constrains user-participation in practice, promoting a conservative and managerialist orientation.

However, it would be wrong to infer from this that users are invariably passive or neutral, or that formalised controls inevitably marginalise user contributions. It is important to recognise that managerial attempts to structure and control user-participation do not exhaust the possibilities, attract universal approval (even among managerial and IS professionals) or come with guarantees of success. In common with accounts of unfettered managerial control over labour in other spheres of working life, images of user subordination in computing frequently obscure the more subtle processes of human interaction and organisational politics. This paper will demonstrate that users are often adept at contesting narrow conceptualisations, creating space for themselves and contriving more positive and influential roles, despite significant difficulties. Through a case analysis of the various subjective interpretations, actions and social interactions of key people in a development project, we flag the importance of informal sense-making and behaviour within the technology process.

In this episode, informal interventions by data entry staff, who basically redefined their job boundaries to include programming and development work, secured positive outcomes which eluded in-house systems managers and suppliers of applications software. These de facto designers were motivated by a sense of disenchantment with the pressures they were confronting in their work, and which they eventually felt compelled to tackle by overstepping the terms of their employment contract. As we shall see, their activities were completely unofficial, remaining formally opaque, although some managers turned a 'blind eye' in tacit approval of their effectiveness. While this case is indicative of the creativity and active agency of ground floor users, counteracting stereotypical images of passivity and dependence on technical 'experts', it also flags important constraints, contradictions and tensions, which eventually took their toll on the individuals concerned.

### **INFORMAL BEHAVIOUR AND PATTERNS OF SOCIAL INTERACTION**

There is now quite a vocal chorus within computing circles lamenting the shortage of detailed information on how the intensely social process of systems design actually unfolds. The primacy of the discourse around the methodologies movement, and its preoccupation with structure, order and control, has relegated the analysis of subjective and informal design activities to the sidelines of mainstream research. Nonetheless, some highly significant empirical

reports have set the ball rolling in an effort to redress the current imbalance.

In an oft-cited paper, Curtis, Krasner and Iscoe (1988) demonstrate that rationalistic design methods are inadequate in themselves since the context and target environment of 'live' software projects frequently display a complexity and subtlety that is beyond conventional computing textbooks and models. Related research by Guindon and Curtis (1988) has taken this further, indicating that the software process is less than rational in practice, with opportunism tending to characterise the behaviour of engineers and designers. This material clearly and convincingly draws attention to subjective attitudes and orientations, highlighting social responses to the conditions under which systems development is conducted. In reality, the production of technology is closely interwoven with organisational changes and human interests. It usually involves a major intervention in the life of a company or institution and is fundamentally a social process in itself, relying on patterns of communication and interaction between knowledgeable human beings (Sharrock and Anderson, 1993).

In a direct appeal to take informal design seriously, Clement (1993) enlarges our conceptualisation of knowledgeable designers to include secretarial and clerical staff. Arguing for a more comprehensive concept of design, embracing social processes of adaptation as well as formal techniques and artifacts, he provides an illustrative case example of secretarial workers creatively changing their working practices to accommodate desktop information systems. By their own efforts in establishing spreadsheet templates, constructing databases and devising word processing conventions, these secretaries informally accomplished the design task of rendering generic software packages effective within their own business environment. Localised adjustments and collaborative problem solving on an incremental basis extended the design process to cover everyday activities, conventions and preferences. His findings develop those, also on spreadsheet users, by Nardi & Miller (1991); and we have observed similar user innovations ourselves in another case study to that discussed below.

Although relatively rare, empirical studies of this nature are immensely valuable in counteracting the exaggerated importance of abstract design models and formal techniques. They also fulfil a broader purpose in debunking the cult of the expert to reveal the hidden yet creative capabilities of ordinary users. As Clement observes:

"Since there are no blueprints or detailed specifications for how one does this sort of design work, and appropriate assistance from others is often not available when needed, secretaries frequently get left to improvise on their own." (p330)

End-users are too frequently missing from studies of design as conscious, reflective actors capable of pursuing distinctive themes and objectives. Too often the image is of passive subjects who adjust, or should adjust, to the

'solutions' presented by those who would engineer their souls. This is reinforced by the tendency to think of design as a fixed stage, followed equally regimentally by implementation, and thus squeezing out the space in modern software programmes at least for continued development in use.

This paper aims to pursue the theme of informal, user-influenced design by casting the analytical net beyond Clement's work-based adaptations. Whilst also claiming space for organisational knowledge in securing the productive use of technology, we further demonstrate the creative capabilities of users in computing terms, in ways well beyond that of adapting small spreadsheet applications. In the case analysis that follows, users actually demonstrated a capacity to intervene in technical design and programming. Here the tacit skills and constructive involvement of shopfloor workers took them beyond conventional boundaries, overcoming entrenched organisational and ideological demarcations.

To be sure, the user interventions we uncovered were possible partly through unusually favourable circumstances (though in the current job market for computing staff in Scotland, where skilled individuals often go unrecognised in pay and status, we wonder if it is so exceptional). Although these specific individuals had some relevant background knowledge from post-school (national diploma) education, they were employed in routine data entry jobs, so in terms of the culture of systems development they were failing to recognise their 'place'. In addition, they were dealing with data structures and information sets that processed the lifeblood of the organisation, and so were crucial to its financial well-being. Blunders during their interventions would have carried major repercussions, for key information flows and business tasks as well as the employment situation of the workers themselves.

This brings us to another distinctive feature of our interpretation, namely, the grounding of informal design in the context of workplace politics and power. Although the centrality of power is now widely recognised, it calls for a new angle on the concept of integrated design. Frequently, integration is presented as a way of acknowledging the crucial significance of organisational and managerial knowledge, and of relating technical disciplines to the context of use. Hence, in flagging informality, Clement sees power in the form of positional prerogatives obstructing the recognition of subjective, local behaviour, thereby stifling a more integrated design practice.

However, power relations have a still more fundamental significance than blinding decision-makers to cross-boundary collaboration. Exposing the narrow-mindedness of positional influence will not remove power from the agenda, because instabilities and tensions are inherent in the social relations of organisational life. Power is not an obstruction, founded upon ignorance or vested interests, but a relationship of inequality between human beings; as such, it has an inevitable bearing on the integrated, participatory design project - that is power suffuses, and reconstitutes the reality of 'empowerment', official or informal. The

working-out of power relations will be shown to have a crucial bearing on the experience of informal design among our key social actors.

#### **CASE ANALYSIS: TAKING CONTROL OF SADIS**

SADIS is a fictional acronym for a student-tracking administrative information system which was initially introduced to our research site, a further education college (FEC) located in Central Scotland, in August 1991. It was conceived as a replacement for a manual, card-driven system which captured crucial enrolment and attendance information as a basis for the management of resources within the college and for co-ordinating its business with funding authorities and the national accreditation and awarding council (AAC).

As a tertiary college, FEC provides post-school vocational and academic courses to some 2000 students on both a full time and part time basis. Places are funded mainly by the local authority (LA) with AAC national certificates and diplomas representing the principal qualifications awarded to students for study periods of typically two or three years.

At the beginning of 1991, LA issued a directive calling for some twenty tertiary colleges within its region to collaborate in a wide-ranging project aimed at computerising all their administrative and management information systems. This would enable funding to be tied more directly to student contact and performance, and rationalise the flow of information to and from the already computerised AAC. Within three months a software supplier, Educational Administrative Systems (EAS), had been contracted to supply and configure the SADIS applications software. Developed on an Oracle platform, the basic characteristics of the system had already been constructed and installed to meet the administrative requirements of English secondary schools. Although this was initially seen as an advantage, avoiding the need to 'reinvent the wheel' by capitalising on development work which had already addressed similar issues, it quickly emerged as the root cause of fundamental difficulties.

Soon after the start of the first computer-live academic year, it was realised that SADIS was falling significantly short of expectations. SADIS had been piloted for one year in another college, but only gradually did the information circulate that that exercise had been a failure. The crux of the problem was that SADIS had been wrenched out of a context that was markedly different, rather than roughly parallel, to FEC and its fellow colleges. It had been written for business processes in educational institutions with settled classes and stable funding that was not so dependent upon daily classroom performance. FEC had to cope with a greater variability of attendance, incorporating part time students and ongoing changes in the mix of classes taken by individuals. In addition, its fee income was becoming increasingly tightly based upon detailed log-books of attendance governing the release of funds by LA, while AAC relied upon regular updates of performance from assignments and projects en route to its various awards.



Confronting this level of complexity, SADIS was simply unable to deliver adequate forms, let alone generate the necessary reports. Worse still, as it became clear that major software amendments were necessary to achieve even barely acceptable functioning, the contractual arrangements with the supplier and authorised 'change agent' signalled the potential for large invoices that could inflict unwelcome damage on FEC finances. However, in the process of muddling through another possibility presented itself, viz., informal and unofficial adaptation. In the event, local staff (who were casually employed solely for data entry) recognised a way of using Oracle query languages to burrow under the formal SADIS construction and trigger appropriate improvements.

## USERS AS ACTIVE DESIGNERS

Tracing the influence of active agency beneath the surface of formal organisation has long been a key project within British and American industrial sociology. A rich stream of empirical studies, mainly focusing on resistance and misbehaviour, provide us with revealing insights into the under-life of organisations, indicating how workers can counteract the pressures of rationalistic management and bend the bars of the bureaucratic 'iron cage'. Roy's classic account of 'quota restriction and goldbricking' and 'the fix' (1952, 1955), Lupton's description of 'the fiddle' (1963) or Burawoy's attention to workers 'making out' (1979) provide good examples, demonstrating how production games and therapeutic horseplay can enable workers to remain functional under tight regimes employing rationalistic controls. The picture presented is of ordinary workers creatively and covertly breaking rules, 'getting back' at managerial excesses or coping with their lot in life, yet often in a fashion that actually assists the realisation of organisational objectives.

It often emerges that informal behaviour may bolster effectiveness and facilitate innovation, with the result that local managers tolerate or even connive in unofficial practices. In Britain, a popular sense of this is generated by the description of one form of industrial action as 'working to rule'. Despite the rationalistic overtones suggesting a systematically derived optimum pattern of work activity, this is commonly understood as a sanction applied against employers by disgruntled workers. Rules and regulations are taken to be ineffective in themselves, requiring tacit abilities and informal behaviour patterns to 'get things done'.

Drawing heavily upon this tradition of social research and extending the 'working to rule' metaphor, this section introduces the main characters in our case analysis. It explains how they responded to the difficult situation surrounding the SADIS development, making adjustments, learning query languages, extending their informal control, and thereby gradually maturing as active designers who were capable of sustaining operational systems.

Maureen and Mary were recruited as data entry operators during the late Summer of 1991. They were employed as casual workers on short term contracts, the first of six

weeks duration, managers expecting this to be sufficient time for all the necessary student details to be incorporated into the system. Since both of them had attended FEC as students, completing a diploma course in computing earlier in the year, they were known to staff and had been approached by the head of the Computing and Mathematics Department who had asked if they were available for some routine work. At this time, the system was already in place, having been installed by EAS.

"We were asked to do just data entry...We didn't get any introduction. The day that we arrived we were shown the forms that the students fill in and we were shown the terminals that we would enter the data through. That was all the training we got."

During the first few weeks, Maureen and Mary spent their time keying data into the system. The workflow involved administrative and lecturing staff passing student records (e.g. enrolment slips, attendance and assessment details) to them for logging on the system so that the Administration and Finance Department could produce the required reports for LA, AAC and FEC executives. Maureen and Mary were located in the same large room as the majority of FEC's administrative and clerical staff, though significantly they were set aside from the main workspace, in a gallery area elevated above the office floor.

Through October 1991, with academic work in full-swing and the system running 'live and loaded', the faults and inefficiencies were becoming more obvious and generating increasing concern:

"Nobody was happy with the system. The reports didn't meet the Departments' requirement, nor did they want many of the reports that were actually generated. Yet there were constantly people coming up and looking for the reports that were simply not available to them through the system."

It was clear that administrative and lecturing staff, who were themselves under pressure to deliver informed analyses for managerial consumption, were growing frustrated, demanding computer output that was beyond the scope of the system. The software was incapable of organising relevant information or presenting it in an acceptable format. Most awkwardly in a fast-shifting real world of changing class membership, correcting enrolment errors or amending details of classes to be taken and the corresponding cost codes to be entered on a student file was extremely difficult and time consuming.

"If silly things happened, even something as simple as changing a cost code, we had to go in and delete all the students in the classes concerned, maybe thirty students...Even if one student changed a class, you had to take them all off [otherwise] it kept that record as a kind of

blank space [or ghost] which confused the system. You had to create a whole new record, and then back up the whole system for each amendment."

Meanwhile, the stress levels kept building, with frustration coupled to additional work loads as lecturers maintained manual attendance and assessment records, for example.

Maureen and Mary quickly found their own way of coping with the inefficiencies. It became clear to them that complaining to the Systems Manager, Don, had little effect. Don was a computing lecturer who had been seconded to the SADIS project.

"[Don] was supposed to be the troubleshooter. He was supposed to write a user manual for both us and the lecturing and office staff, but we never saw it. He was supposed to set the back-up procedures, to do any updates that came it [from the vendor]. He was supposed to be there when it broke down, which it frequently did...but he wasn't interested in managing this part of his job."

While Don may have been unusually hands-off in his approach, our visits to other colleges revealed similar problems for the individuals there who had been allocated the task of managing an unworkable system with only partial relief from their teaching duties - mention of SADIS to these individuals in each case produced expostulations, and occasional deleted expletives. In FEC, with the system not running at all smoothly, and Don not willing or ready to tackle what, for many, were thorny issues, Maureen and Mary formed the view that the only way to deliver the desired reports and to relieve the pressure and improve their own work experience was by taking direct action:

"You either could wait several days for the supplier or just go on and do it. There didn't seem to be much point hanging about waiting."

In figuring out how to 'do it for themselves', they began trawling through user manuals written for the underlying Oracle platform, absorbing what they took to be the most accessible information:

"We started from scratch going through the basics and finding out from there how to do things...If we were really stuck we would go to another computing lecturer, Philip, who was the specialist at [FEC]."

As past students of FEC, they were using their contacts and sourcing advice from personable members of staff. The emerging logic suggested that they intervene by essentially tunnelling under SADIS to secure results via Oracle, although they readily conceded that they were not really cognisant of what this meant or of the potential consequences for the data base.

"We wanted to write new reports; so what we did was to tell Oracle to put a header in, select from the tables this information and lay it out in the required way. All this was done in Oracle...[SADIS] just didn't meet the requirements."

Instructing the system to change forms or even write different reports using structured query language was their idea, and one which we found paralleled by an operator in at least one other college, though elsewhere it was the system managers who were more likely to act on this. More risky and difficult was changing the information in the system. By their own jargon, they were 'chopping up the data', something which at this stage does not seem to have been attempted in the other colleges. This translated as:

"...pulling some of the records off the database into another system, and going through it breaking the records up, taking parts out and then saving to another package to send it off to AAC."

This is quite remarkable, demonstrating flair, creativity and confidence, because their own study of computing at FEC had not covered relevant areas. They had no experience of Oracle or networking. Yet when pressed for an explanation they merely highlighted perseverance. They had pursued this:

"By digging through the manuals. I mean, both of us had basic programming so we knew other languages, but this was the first 4GL that we'd ever used. Pascal we had used before, not a 4GL like this."

The first sign of tacit approval for this informal design came from Don, the Systems Manager.

"We did ask [Don] if it was okay, but he said that if anything went wrong, it was on our heads. Initially, we didn't change anything. You can imagine this data just sitting there in big columns, all we did was to go in and pull the information off. We didn't do any changes initially."

However, the attitude and general approach adopted by Don proved crucial in influencing Maureen and Mary's subjective responses to the project difficulties. As the designated 'super-user', he carried overall responsibility, supposedly policing access and controlling security, though with limited diligence and imagination. He rarely changed the passwords or selected terms that were beyond the reach or anticipation of the operators. Hence, they enjoyed considerable freedom and room for manoeuvre:

"I think [Don] looked at his job as a bit of a skive [vernacular pertaining to evading work]. I mean the password for Oracle was still Oracle for a year...I think he thought the system would look after itself since it had been written by professionals, so it would be well-tested

and foolproof. Also he knew that he had [Mary] and me there."

Over time, a regular pattern of intervention was established, especially with the informal grapevine spreading news about their capabilities:

"People would happen to mention [reports] and others would say 'Oh, how did you get that?', 'we asked them to produce it and they did. So it just got that there was no peace for us because people were coming up and saying: 'I want this information but in that layout. It just got to the point that SADIS was doing nothing and we were producing reports outside it...Afterwards, we actually put a board up to stop the lecturers coming through, with a sign on it saying' SADIS - you can't come in, go away!'"

Around this time, apparent managerial approval for Maureen and Mary's efforts took an interesting twist. Following a suggestion by some computing lecturers, managers sponsored their attendance at a training course in structured query languages organised by a local university. This was a four day course initiated by senior IS members of all the LA colleges adopting the SADIS system. It was targeted at 'super users', systems managers, although the emphasis on Oracle was prompted by a growing appreciation of the sort of issues that Maureen and Mary had discovered by trial and error. Certainly, the course became the focus for an outpouring of concerns, with some consensus at this level about the need for local action. It provided quasi-recognition and marginal accreditation for Maureen and Mary more than actual knowledge - by the time they went on the course, they found that they had worked through everything it covered for themselves.

Yet there was no change to the unofficial status of the local interventions. Indeed the lack of formal recognition and explicit support blunted the impact of the changes. Certainly, reticence and a lack of trust marked the reactions of some lecturers:

"We were asking them to give us input documents, standard input documents with proper control procedures for entering the students data and they would still say: 'Here is a spreadsheet that I made earlier, why don't you use that?' In fact, one lecturer wanted us to take the content of his floppy disc to update the database...Some lecturers didn't appreciate the efforts we were making. It was taking us hours to get a report to work."

Managerial approaches both to the SADIS project and broader human resource issue undoubtedly contributed to the cautious, measured and even obstructive position taken by some lecturers. Status, class and gendered subjectivities could also be significant:

"They treat us like secretaries. You know, it's like 'do this', it's like sweep the floor', 'get the coffee'...I know it upsets the secretaries, and it did upset us in the same way."

Clearly, a full appreciation of the social relationships surrounding SADIS requires attention to wider-ranging influences.

### **INSTITUTIONS, CONSTRAINTS AND THE LIMITS OF 'EMPOWERMENT'**

At one level, this case clarifies the reflective creativity of social actors regardless of their formal status or positional power. We are able to see the detail of participative design and to appreciate the significance of highly subtle and frequently neglected social processes. However, caution is required to avoid romanticising the informal, or in this instance overstating the extent and significance of the **relative** autonomy displayed by Maureen and Mary. The structuring of human agency, of patterned behaviour, becomes an important consideration, gauging the influence of economic forces and important elements in the wider culture, such as notions of masculinity.

The foregoing analysis has already generated some sense of how the informal development work was located within a particular managerial regime. This in turn was influenced by sectoral developments and others arising from contracting and outsourcing ties. Increasingly, researchers are utilising a 'firm-in-sector' approach to trace these connections and chart their full impact on the technology process (Fincham et alia, 1994; Smith, Child and Rowlinson, 1990). Company coalitions and inter-firm networks and alliances are considered to be adding further complexity to systems development, rendering it a more protracted and painful process. Our case material provides some support for this, although a full delineation is beyond the scope of the present paper. Since SADIS was installed at other LA colleges, comparative research is still in progress, investigating inter-college dealings with EAS and contrasting local responses to familiar problems. For the moment, a brief insight into the EAS operation should confirm the importance of relating informality to structuration.

SADIS had been copyrighted, leaving FEC managers and, by extension, Maureen and Mary in no doubt that their local intervention was at the margins of legality. EAS policed the system by setting 'internal flags' which could destroy data or render some inaccessible. In addition, the company absorbed feedback from the colleges, including suggested improvements. Software would then be amended and installed (with a fee charged for the service) by overwriting major parts of the established system with 'new generation' products. This raises the possibility that the colleges were being used as a source of free trial or development work by EAS. More specifically, for Maureen and Mary it signalled the need to be defensive and guard against the loss of their own work in an "overwrite". This meant down-loading local alterations, maintaining copies



and re-installing after EAS visits, an exercise that was both stressful and time-consuming. Stress was also high when previously untried interventions were made, in case the system crashed - in FEC and in the other LA colleges we visited, those who did make changes often used phrases such as Mary's: "Your heart was in your mouth when you pressed the 'Enter' key and waited to see what would happen..."

Our interviews with the two operators uncovered feelings of anxiety and considerable cynicism about their position. They would be penalised if they were caught, yet pressurised and potentially sanctioned if suitable reports were not forthcoming. In their view, managers were protecting their own position and saving FEC considerable amounts of money by pushing the operators out on a limb.

"The people who were in charge knew what we were doing but said that it would be on our heads if it came to any grief: 'we don't want to know' was their line all the time. 'We don't want to know what you are doing just do it, just get it done, get the reports produced on time.'"

The informal concession of control was significant, but always reversible given the basic power relations and institutions. In FEC we noted above that **gendered status** remained an important element of how the situation was played out (enacted also through persistent suggestive conversations and physical actions by Don, the systems manager, reported by Mary and Maureen, to which they responded by creating a stream of jokes and puns about Don's behaviour). Our analysis has become more assertive in this respect as we visited other LA colleges and found a similar pattern of gendered evolution of systems management. Typically, it seems that early on female staff were given low-status rank and official role to run SADIS, usually under a male systems manager. They exerted differing degrees of actual control, depending on their knowledge and circumstances, but all found after two years that the shift to a more assertively quasi-market system and the problems with SADIS led college managements to appoint full-time systems managers. Almost invariably these were male; and in asserting their control where female staff had previously used informal methods, these men effectively overwrote the previous approach. It was they who benefited from officialization of their control over the system.

In one case, a woman who had been a secretary before SADIS arrived had used night classes, with fees paid by her employer, to obtain a computing qualification, then found first one and then a second man appointed above her. She was planning to seek a degree (her college was no longer willing to support her self-improvement), and clearly felt unappreciated. Her control had been reduced to dealings with AAC, where once she had been on the network meetings of the colleges with EAS and had been allowed to develop the system in her own way (though less radically than attempted by Mary and Maureen). The gendered nature of

these organisational constraints is a matter we hope to investigate further in future research.

Meantime, with the working-out of these structural forces, Maureen and Mary had mixed emotions about the patterned informality of design. Though strident in condemning the stress and threatened accountability in their lives, they took enormous satisfaction from their independent efforts:

"When you are sitting and just keying in all these forms all day long, you do get bored, so it broke up the day. It also let us use some programming skills; it was a buzz to get things working."

#### **CONCLUDING REMARKS: REFLECTING ON PARTICIPATORY DESIGN**

As noted at the outset, our previous work established that development projects are often construed as being user-led without entailing any purposeful or independent user influence. The case exemplified in this paper highlights the active agency and creativity of grassroots staff in making their influence effective. Clearly, ordinary users are not invariably passive. Nor are they incapable of making a positive contribution to systems development without the crutch of independent technical expertise. Maureen and Mary blazed their trail of informal design without the help of facilitators, 'hybrid specialists' or complex integration mechanisms. Indeed, the point is that they took the initiative themselves, in the absence of formal support systems and despite significant pressures and constraints.

This is encouraging from the standpoint of participatory design. Enthusiasts for this project have forcibly argued against the rationalistic preoccupation with conducting design by the rule book, preferring a more enabling, collaborative approach that promotes meaningful participation. The importance of contingency should not be ignored, however. A number of favourable factors enabled the conjuncture we found had occurred at FEC. The informal contacts and familiarity of the two women with FEC itself lowered barriers and gave them important unofficial resources in the form of expert advice on Oracle. Their own computing background, even though not immediately relevant to this system, was clearly crucial. The fact that there were two of them, and that they could support and reassure each other, seems to have strengthened their resolve and boldness considerably. And their arrival on the scene at a time when the system was new, and management had not grasped either its weaknesses or the potential for controlling it gave them the space to act. Perhaps, too, there is a technical 'spin', which would be interesting to discuss - if despite the growing complexity of modern 4GLs and object-oriented systems, they did give greater power and flexibility for local adaptation and control than previous software platforms. Yet although all these conditions occurred only at FEC of the colleges we visited, we found the tracks of some significant parallels on a less ambitious scale elsewhere.

Although our champions of informal action at FEC clearly breached the conventions of rational management and

project control, they were decidedly negative when judging the power and influence at their disposal. They were creative and successful despite the prevailing development scheme, and ever mindful of the problems and risks they were confronting. Their activities were significantly constrained, though clearly they were never so tightly hemmed in that purposeful action was seriously curtailed.

Nonetheless, there were few signs here that decision makers were listening to new approaches to systems development. It has frequently been suggested that managers are now open to a participatory design agenda because they are tired of taking the blame for poor systems (Greenbaum, 1993). However, in this case senior staff seemed entirely happy to withhold formal support in respect of measures that were producing positive results. This was not out of a unitaristic commitment to managerial prerogatives since tacit approval was given to shopfloor action that could have 'damaged' authority figures such as the systems manager. Nor is it attributable to a rationalistic belief in the sanctity of technical work which should be restricted to qualified experts. These managers were comfortable with the idea of Maureen and Mary pursuing their own interpretation of operational priorities by harnessing structured query languages. There was no sense of FEC's managerial approach being damaged by sending low level users to a 'super users' training course. Yet defensiveness and limited horizons still had a bearing on their treatment of the informal practices, not least because of the structural constraints posed by EAS and the sectoral linkages to external forces such as the LA and the AAC.

Contradictions in the relationship between FEC and the external agencies contributed to the experience of informality as a double-edged sword. Although SADIS was imposed, constructed, installed and policed by external authorities it could only be made to work through local action which breached rationalistic and externally approved conventions on effective practice. Hence, Maureen and Mary were officially left to their own devices. The informal intervention was their initiative and would remain as such, providing a graphic illustration of how contextualising forces exert an ongoing influence on the experience and potential of participatory design. This leads us to seek to supplement Clement's (1994) useful analysis of the potential for empowerment for users in two ways. Firstly, the dichotomy of 'democratic' and 'functional' types of empowerment, the former a result of genuine employee control, the latter management-driven and aimed at increasing work intensity, seem from the case study not to exhaust the possibilities. In particular, we have described empowerment which was not management-driven, nor unequivocally positive for users.

Secondly, we reinforce Clement's hints of pessimism about how far such changes could go, and so express rather stronger doubts about the potential for official recognition to follow for innovative users, especially in a gendered context (which Clement does also touch on). We hope to explore these questions further in a future paper.

Meanwhile, some final words from Maureen and Mary remind us how they arrived at the decision to take control within the limits constraining them and despite the costs incurred:

"The worst that could happen is that we would be given the sack, and really we weren't bothered. Neither of us at the time really cared because we were only getting paid the lowest office job wages, and we thought well if it doesn't work and we get into a lot of trouble it's too bad. Since we were both indifferent about it, we thought should we do it? Maybe not... oh come on, we will."

## ACKNOWLEDGEMENTS

Apart from Mary and Maureen, many people have given freely of their time to talk to us about their experience of SADIS and its successor systems in the LA colleges. We would also like to thank both reviewers of this paper for the conference. Their remarks were both supportive and helpful, and we have tried to respond to their suggestions in the final conference version. Thanks are also due to the ESRC for funding the project from which this research material has been drawn.

## REFERENCES

- Beirne, M. and Ramsay, H. (1992) 'A Creative Offensive?: Participative Systems Design and the Question of Control', in Beirne, M. and Ramsay, H. (eds), *Information Technology and Workplace Democracy*, London: Routledge.
- Burawoy, M. (1969) *Manufacturing Consent: Changes in the Labour Process Under Monopoly Capitalism*, Chicago: Chicago University Press.
- Clement, A. (1993) 'Looking for the Designers: Transforming the 'Invisible' Infrastructure of Computerised Office Work', *AI and Society*, 7, 323-344.
- Clement, A. (1994) 'Computing at work: Empowering Action by "Low-Level Users"', *Communications of the ACM*, 37, 1, (Jan), 53-63.
- Curtis, B., Krasner, H. and Iscoe, N. (1988) 'A Field Study of the Software Design Process for Large Systems', *Communications of the ACM*, 31, 11, 1268-1287.
- Fincham, R., Fleck, J., Procter, R., Scarbrough, H., Tierney, M. and Williams, R. (1994), *Expertise and Innovation: Information Technology Strategies in the Financial Services Sector*, Oxford: Clarendon Press.
- Greenbaum, J. (1993) 'A Design of One's Own: Towards Participatory Design in the United States', in Schuler, D. and Namioka, A. (eds) *Participatory Design: Principles and Practices*, New Jersey: Lawrence Erlbaum.
- Guidon, R. and Curtis, B. (1988) 'Control of Cognitive Processes During Design: What Tools Would Support



- Software Designers?', in Conference Proceedings of CHI, May, Washington DC, 263-268, Chicago: ACM Press.
- Lupton, T. (1963) *On The Shop Floor*, London:Pergamon Press.
- Nardi, B. and Miller, J. (1991) 'Twinkling Lights and Nested Loops: Distributed Problem-Solving and Spreadsheet Development', *International Journal of Man-Machine Studies*, 34: 161-164.
- Roy, D. (1952) 'Quota Restriction and Goldbricking in a Machine Shop', *American Journal of Sociology*, 67, 427-442.
- Roy, D. (1955) 'Efficiency and "the fix": Informal Intergroup Relations in a Piecework Machine Shop', *American Journal of Sociology*, 60, 255-266.
- Sharrock, W. and Anderson, B. (1993) 'Working Towards Agreement', in Button, G. (ed), *Technology in Working Order: Studies of Work, Interaction and Technology*, London.: Routledge.
- Smith, C., Child, J. and Rowlinson, M. (1990), *Reshaping Work: The Cadbury Experience*, London: Cambridge University Press.