Developing usability and utility: a comparative study of the users of new IT

By

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Abstract
The paper, based on a major comparative study of the introduction of management information systems in retailing, health and higher education, argues for a broader and more differentiated account of users in studies of technological innovation. End-users play a crucial and active part in embedding new systems into organisations and into their own organisational lives. The particular foci of this paper are two key aspects of the relationship between users and systems - usability and utility. Detailed analyses of qualitative interviews with users reveal that the issue of how a system becomes usable encompasses much more than the technical problem of making it ‘user-friendly’. By classifying discussions of usability into six distinct components the paper recasts usability as a multifaceted phenomenon that is as much social as it is technological. The development of utility is explored through a discussion of three different groups of users - one drawn from each of our research sites. Each group is taken to exemplify different locations in and stances towards processes of techno-organisational change. Doctors in a public health laboratory are characterised as privileged participants whose status enabled them to reshape important aspects of a new system for managing test results to fit with their professional needs. The store supervisors of a major high street retailer, on the other hand, were compelled participants who worked hard to develop the value of a staff planning system on management’s terms. Finally academic secretaries were empowered non-participants whose position within a university enabled them to refuse to operate a new system until it was changed to provide them with benefits.
Introduction
In recent years, critical approaches to understanding and managing technological innovation have become increasingly concerned with ‘the users’ of new technology. This is part of a move away from presenting technological change as a simple driver of organisational change (Jackson 1997). This move is premised on the basic but important insight that technologies are social and political products. Much discussion of ‘social shaping’ has, however, focussed on the design of technological systems. Now there is a desire to complement this by considering a wider set of actors and socio-cultural influences than previously allowed (McLoughlin & Harris 1997). There is a growing interest in what happens when and after a technology is introduced into a workplace.

The call for a clearer and richer understanding of the processes whereby organisations come to acquire and use new technology has been made for some time now (Clark 1987). In particular the drive is to establish how the peculiarities of specific organisational settings influence the use, character and impact of ostensibly similar technologies. Seaton and Hayes (1993), for example, discuss the ways in which innovations are assimilated into organisations’ existing technological ‘portfolios’. Various writers explore factors that enhance or inhibit organisations’ capacities to be effective acquirers and users of technology (Mansfield 1992, Radnor 1992, Bessant 1993). An implication of this shift in focus to the implementation and post implementation of technological systems in organisational settings is to recast innovation as contingent, local, unpredictable and as taking place over an extended period of time. A further implication is that the end-users are participants in that process. Arguably the critical literature has yet to explore fully either of these implications. This paper seeks to advance understanding of these issues by:

• Suggesting an approach for analysing the role of end-users in innovation by borrowing from both Social Studies of Technology (SST) and the sociology of consumption.
• Developing a broader and more differentiated account of ‘the user’. In innovation literature ‘the user’ can merely be shorthand for management. When the role of end-users is acknowledged they are often treated as an unproblematically homogenous group. We argue that a full analysis of innovation within organisations must acknowledge the variety of attitudes and relationships that differently placed users develop towards new technical systems.
• Investigating how differently placed users mobilise organisational and other resources in order to influence the course of innovation. Discussion of this process inevitably leads us into a discussion of inequalities.

Central to our analysis is the contention that much work remains to be done on new systems when they ‘go live’ within organisations. As such, end-users play a crucial part in embedding systems into organisations. Both technology and organisation alter during the process of techno-organisational change. Something of this is captured in Fleck’s (1994) notion of ‘innofusion’: it stresses the ‘mutual adaptations’ that occur once technology arrives in an organisation. Similarly Orlikowski (1992), borrowing from SST (Pinch and Bijker 1987), suggests that when technology first enters an organisation it is ‘interpretively flexible’ and there is still a space in which users can play and develop varied roles and functions for the technology and for themselves. As
routines develop and operational practices are secured, this 'flexibility' reduces and the technology takes on a fixed quality. Flexibility, as Orlikowski suggests, 'is a function of the material components comprising the artefact, the institutional context in which a technology is developed and used, and the power, knowledge and interests of the human actors (developers, users, and managers)' (1992: 421). This flexibility and the technological, organisational and other factors that come to limit it are our major concerns.

We, therefore, view innovation as a socio-technical process rooted in the specifics of a particular organisational setting (McLaughlin et al 1999). Users play a significant part in developing new organisational, occupational and technological roles and relationships. This involvement is however framed by factors within and beyond the organisation such as patterns of power and status, and dynamics of regulation and knowledge. This suggests new ways of thinking about the inequalities of techno-organisational change. Differently placed users may have very different positions in the development of systems within an organisation and may 'incorporate' those systems into their working lives under very different conditions. To assert that a variety of definitions and evaluations of technology are articulated during acquisition and implementation does not imply that all have an equal chance of being 'stabilised'. Understanding the stabilisation process is therefore about mapping the power relations in organisations that contribute to the reduction of flexibility and the privileging of certain needs and uses.

In the light of this analysis our concern is to study the processes of technology acquisition in detail, focusing on the influence of organisational relations and centring on the perspectives of end-users. This paper focuses on two key aspects of the developing relationship between users and systems - how the new technology comes to be usable and useful. We contend that the establishment of a new technological system in an organisation requires users to be, in a multiplicity of ways, enrolled into the logic of that system. The development of usability and utility - as the system comes to make sense in their particular setting - are crucial to this enrolment. The paper will indicate that 'usability' is a far broader issue than the technical problem of making a system 'user-friendly'. Similarly, how and why systems come to be useful are highly contextual and variable factors.

The paper is based primarily on data from a recently completed ESRC funded research project1. This project involved studying the implementation of new IT systems in three, contrasting organisations. After briefly introducing our three research sites, the paper discusses the concept of usability in relation to our empirical findings. Our key argument here is that usability means different things to different users in different settings. The next section goes on to consider the relationship between the development of usability and utility. Taking one group of users from each organisation as case studies it explores how utility for these users develops over time as part of a process whereby IT systems are embedded in organisations. The three examples have been chosen to highlight the variety of different positions and perspectives taken by users during techno-organisational change. The different stances adopted by the three groups of users also reflect the different organisational and extra-organisational

1 project number R000236105
resources they had available to them. In discussing the varied levels of user participation and non-participation we argue that there is not a simple equation between participation and power in innovation processes. For some groups of users, non-participation can be powerful. The paper closes with a discussion that further considers the contextual and contingent nature of usability and utility. In doing so it explores factors that influence both the different stances of users and the emergence of inequalities during techno-organisational change.

**Bancroft, Brodies, and Finlay**

The primary motivation underlying our research project was to gain a greater understanding of the role of end users in the introduction of new IT. This led to a focus on the innovation processes that occur after initial implementation of systems. We selected three organisations that were currently implementing new IT - a university, a national retailer and a group of hospital labs. These were different in size, structure and context. To protect anonymity each has been given a fictitious name (as has the IT system in two of the cases). We conducted one hundred and ninety qualitative interviews. Some of these were with the designers, managers and implementers of the system. The majority, however, were with the 'ordinary' users. The focus of the interviews was on people’s experiences of being introduced to and then using the new systems. In addition we carried out some observation at the sites and obtained access to background material such as operating requirements and instruction manuals. A series of return interviews were undertaken with a core group of respondents in each organisation to obtain data about changes over time. Interview data was analysed using NUD*IST software.

'Bancroft' is a British university established in the 1960s. Although comparatively small, the organisational structure of the university is complex and there is a strong sense of autonomy across the different academic departments. The new IT system at Bancroft is called the MAC (Management and Administrative Computing) system and was purchased collectively by a number of universities who had participated in its design and development. MAC is a modular system, comprising six components: Student Records, Finance, Physical Resources, Payroll & Personnel, Research & Consultancy, and Management Information. Much of our research focussed on the Student Records and Finance modules. Student Records is used to maintain data concerning all students registered at the university. The system can then be used for searching individual records or for running reports, both centrally and locally. MAC Finance is used to post all financial transactions that take place in the university. Our respondents at Bancroft included IT support staff plus some of the key staff in charge of MAC, and a range of users. These users included administrative and management staff in central departments such as the Student Registry, Finance and Estates and secretarial and technical staff in academic departments.

'Brodies' is a well-known retail chain in the UK with over twelve hundred stores. A rigid system of line management runs from Head Office - via Area Offices - down to the individual stores and the store manager. The management hierarchy is supported by a strong 'family' culture that has been actively promoted by Brodies management. As our interviews testify this culture exerts a powerful influence over store life. In common with many retailers, the hierarchy in Brodies includes a visible gender division of labour. In large stores the manager works with their mostly female
management team. The link between management and the shop floor are the supervisors, who, along with sales assistants, are mostly female.

The system we call The Staff Organiser is a staff planner that was introduced into all Brodies stores. The system uses till transaction data collected from the store Electronic Point of Sale (EPOS) system to produce plans that allocate staff to tasks throughout the store day. At the busiest times, the Organiser concentrates staffing on so-called 'priority tasks' such as operating cash points and providing 'customer service'. Priorities are set centrally in the system and cannot be altered by stores. Supervisors provide details about the skills of each member of staff and rank their proficiency at each skill using categories included in the system. The system uses local and central data to produce detailed staff plans for each department in the store. Each shop floor member of staff is listed on the plans, alongside a grid of codes and symbols that map their day in fifteen-minute segments. We interviewed Head Office staff responsible for the introduction and design of the new system, and in stores, the store managers, other members of the store management team and supervisors.

'Finlay' is a large teaching hospital linked to its local university. Our study focused on two PHLS (Public Health Laboratory Service) laboratories at the hospital: Bacteriology and Virology (collectively known as Microbiology) which were part of a wider group of laboratories purchasing the IT system. Microbiology provides clinical and other micro-biological services principally associated with testing hospital and GP patients' samples. In addition, as a PHLS laboratory it performs a wider, more strategic, role at regional and national levels, in mapping the history and epidemiology of specific diseases such as diphtheria and AIDS.

We have called the IT system at Finlay the 'Patient Based System' (PBS). PBS - much like MAC - is a modular system designed for use as a hospital-wide system. The laboratories purchased those modules related to their work. PBS is a patient-based record system of all tests carried out in Microbiology and Pathology laboratories. This allows management information data to be collected and bills for contractually agreed work to be produced. The new system requires all samples to be registered to patients before tests are conducted. Once registered, a bar code is produced and placed on the sample. The system also sets protocols for tests - outlining procedures to be followed and the appropriate responses to results. Because the system is Pathology-wide, laboratory staff can also access information on tests on a patient's samples being conducted in other laboratories. It was anticipated that a year after going live PBS would be linked to the hospital management system (HISS). We interviewed a range of staff in Microbiology, including senior management, medical consultants, Medical Laboratory Scientific Officers (MLSOs), laboratory assistants and clerical staff.

**Developing Usability**
In each of our case studies, sponsors of the new IT system had - to a greater or lesser extent - made efforts to involve users in design and implementation. These efforts included pilot trials, training days and various forms of support literature and software. Nevertheless, in each case - even though users often had high expectations of the new systems - when the system 'went live' it prompted immediate concerns about its usability: initially many users had considerable doubts about the effectiveness of their system and/or their own competency to use that system.
Prior to and following implementation, system sponsors understood problems of usability primarily as technical - typically the issue was framed in terms of making the system 'user friendly'. Interviews revealed, however, that for users, usability encompassed much more than this. We discussed with respondents how they used their new systems, what problems they came across and what attempts they and others made to resolve such problems. In the light of these discussions we broke usability down into six related but distinctive components summarised in Figure 1.

**Figure 1: Elements of Usability**

We do not claim that this is a definitive list or one with universal application. By analysing and categorising usability in this way, however, we do show how it is a multifaceted issue that is as much social as it is technical. Usability is not simply designed into the technical capacities of systems but is achieved by integrating systems into (changing) organisational roles, practices and cultures. In addition, there are two striking elements of our analysis of interview data on usability: firstly, the extent to which users’ evaluations of systems’ usability developed over time; secondly, how much users’ interpretations of and priorities towards usability varied according to occupational role.

We examined the interviews to see how respondents in different roles defined, discussed and constructed the different aspects of usability. Tables 1, 2 and 3 summarise the data from our first round of interviews. The tables are broken down by the relevant job grade in each site. There are two points relating to the structure and content of the tables that are important to explain. Firstly, the bold text signifies the component of usability that was most significant for that job role. Secondly, in Table 2 about Brodies, checkability does not appear. This is because respondents did not
mention issues that could be linked to this aspect of usability. This helps stress the point that our six categories are not universal or exhaustive to all settings and technologies.

While other differences between users may well also be significant, the tables support our contention that occupational role plays a highly significant part in determining users’ understandings and expectations of usability. The tables highlight variations in both what forms of usability were considered the most significant and the ways that usability criteria were defined: what made the system easy, what constituted a quick system, and what enabled them to be confident, varied for different users.

In our first round of interviews at Bancroft (see Table 1) it was clear that most users felt that MAC was not easy to use. This issue was particularly important for secretaries and laboratory managers who had to use it daily to perform key tasks. The other common theme for these frequent users was finding the system slow. Significantly, this was articulated in comparison to their previous systems. From very early on, these users appeared to augment the usability of MAC by turning to alternative solutions for their concerns. An example of this was the secretaries’ use of paper checks: they retained full paper records of the students in their department, which at times were more up to date than the records held in MAC. While checkability was important to secretaries, they felt it more productive to develop this outside the system. Whether MAC was checkable was the area where there was most disagreement across the different job grades. According to database administrators the system had adequate checks. For laboratory managers and secretaries the ability of the system itself to ensure the validity of its data was suspect. The dispute revolved around competing definitions of what constituted both adequate checks and the scope of information that needed checking. For example, part of what enabled academic secretaries to check the accuracy of their local data was their informal local knowledge of the students. This knowledge was retained in their local paper notes but could not be replicated in MAC, so when they wished to check accuracy it was to their own – supposedly redundant - notes to which they turned.
<table>
<thead>
<tr>
<th></th>
<th>SECRETARIES</th>
<th>LAB MANAGERS</th>
<th>GENERAL SUPPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHECKABILITY</strong></td>
<td>Some retain paper as a double check.</td>
<td>Checking in the area of ordering supplies is a particular concern.</td>
<td>Services keep a check on things in the system</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Finance no responses.</td>
</tr>
<tr>
<td><strong>CONFIDENCE</strong></td>
<td>Lack of confidence in their use of the system and in the reliability of the system itself.</td>
<td>Little confidence in the reliability of the stock and ordering information.</td>
<td>No responses.</td>
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<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>CONTROL</strong></td>
<td>A little evidence of lack of control of their data in the system.</td>
<td>No responses.</td>
<td>Services and Finance feel they have little control of system and data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EASE</strong></td>
<td>Ease missing, the number of keystrokes and screens is the main reason.</td>
<td>Keystrokes are a serious cause of lack of ease.</td>
<td>Depending on particular aspect of Support, some ease does exist.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SPEED</strong></td>
<td>Considerable unhappiness with slowness of MAC.</td>
<td>Find the system slow for ordering stock.</td>
<td>Finance find the system slow, slightly better for Services.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>UNDERSTANDING</strong></td>
<td>System seen as difficult to understand.</td>
<td>Doubts as to how easy it is to understand the system, esp. for occasional users (academics).</td>
<td>Services believe that lack of understanding widespread.</td>
</tr>
</tbody>
</table>
| DBA: Database Administrator; General Support: Generic category for people working in Finance, Services and Estates.
<table>
<thead>
<tr>
<th></th>
<th>STORE MANAGERS</th>
<th>ACCOUNTS</th>
<th>SUPERVISORS</th>
<th>PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIDENCE</td>
<td>Having to build confidence in computer after being used to and trusting paper.</td>
<td>Initial difficulties have meant that confidence has taken time.</td>
<td>Confidence has developed over time, damaged by early experience.</td>
<td>Feel they have a crucial role in building confidence in planners with supervisors.</td>
</tr>
<tr>
<td>CONTROL</td>
<td>Ensures managers gain clearer control over supervisor practices.</td>
<td>Lack of control within Sales Support.</td>
<td>Supervisors feel they had more control over previous system.</td>
<td>Lack of control in beginning using requiring it more carefully.</td>
</tr>
<tr>
<td>EASE</td>
<td>Easy to use, complicated to get right.</td>
<td>Computer itself easy to use.</td>
<td>Lack of ease came from unfamiliarity and terminology in the plans.</td>
<td>Layout of reports is the problem.</td>
</tr>
<tr>
<td>SPEED</td>
<td>Speed is a clear-cut benefit to stores, customers and staff.</td>
<td>Changes allow them to get the plans off a lot quicker.</td>
<td>Quicker than previous system.</td>
<td>Have had difficulties getting the particular reports off quickly.</td>
</tr>
<tr>
<td>UNDERSTANDING</td>
<td>Want to understand how it can help the stores</td>
<td>Worry about their lack of understanding means that they make mistakes.</td>
<td>Keen to have an understanding of how the system works.</td>
<td>Believe of understanding significant the system used effectively.</td>
</tr>
</tbody>
</table>
## Table 3 Usability at Finlay by Job Grade

<table>
<thead>
<tr>
<th></th>
<th>DOCTORS</th>
<th>MLSOs, MLSO2s AND CLINICAL SCIENTISTS</th>
<th>TRAINEE MLSOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHECKABILITY</td>
<td>Important and questioned.</td>
<td>Concerns with how checkable PBS is in comparison to paper.</td>
<td>Believe it to be checkable.</td>
</tr>
<tr>
<td>CONFIDENCE</td>
<td>Growing from a shaky start.</td>
<td>All have had to develop this, CS's having the most difficulty.</td>
<td>Have developed a confidence with what they do with it.</td>
</tr>
<tr>
<td>CONTROL</td>
<td>Question over their control of the system.</td>
<td>Feel controlled by the system.</td>
<td>Sense of training being controlled by system.</td>
</tr>
<tr>
<td>EASE</td>
<td>Easy to use, but find that it does not fit easily into their job.</td>
<td>All see it as an easy system - easier than the previous system.</td>
<td>System is seen as very easy more so than the previous system.</td>
</tr>
<tr>
<td>SPEED</td>
<td>Takes time away from their 'real' role.</td>
<td>Find the system quick when they are using it day to day.</td>
<td>System is seen as considerably quicker than previous system.</td>
</tr>
<tr>
<td>UNDERSTANDING</td>
<td>Growing, but still limited, would like more understanding.</td>
<td>Happy with a limited understanding.</td>
<td>Happy with a limited understanding.</td>
</tr>
</tbody>
</table>

The respondents used to produce this table came from Microbiology and Tissue Typing
At Brodies (see Table 2), what is interesting is that while those in Head Office felt that if they could make the system easy to use, usability would be achieved, the only group in stores who during the first round of interviews appeared to share this concern to anywhere near the same degree were supervisors. Ease of use was most important for supervisors because, in their job role, being able to use and communicate plans in the busy setting of the shop floor meant they had to be, above all, clear. They explained this in relation to their role of looking after their sales assistants. Supervisors wanted the plans to be easy enough for ‘the girls’ to understand. As with secretaries in Bancroft, these users looked to augment the capabilities of the system by drawing in other technologies and practices. For example, supervisors in different stores began to colour code the plans used on the shop floor to allocate staff to activities using highlighter pens so that staff could, for example, see more quickly what cash point they should staff and when. For those in the store management teams at Brodies understanding the system appeared to be more significant. This reflected both the different uses they were involved in and their different job role. Both the accountants and the personnel officers felt it was now part of their job responsibilities to get the system working in stores. They also believed that their own misuse or lack of understanding contributed to problems with the system.

In Finlay (see Table 3), ease of use rarely emerged as a strong theme in our initial interviews with users. In part this was because few users felt that the system lacked ease. Instead, all groups apart from laboratory aids and clerical staff had other concerns. In particular, given that this was a group of hospital laboratories completing tests on patients, ensuring the system was checkable was a strong concern. One interesting finding that emerged was that, even though scientific officers who conducted tests on samples (MLSOs) had to spend a bigger percentage of their day using PBS than doctors did, they found the system quick while the doctors found it slow. Their different attitudes related to the different value they placed on the time spent using the system. PBS was an unavoidable and significant aspect of the MLSOs’ work in the laboratory. For doctors, having to use it was something they perceived as time taken away from what they really should be doing - their ‘proper’ role.

As the three tables and summaries above suggest, ‘usability’ concerns are variable and complex. Usability is highly contextual and dependent on a range of factors beyond as well as internal to the system. Users’ understandings of usability emerge out of their experiences of other systems, their position in the organisation and the terms under which they came to be users. For example, it was mainly occasional users who focused on wanting the system to be quick and easy. Those for whom the system was a central aspect of their work wanted to be confident in using it and have control over what it did.

The summaries show usability to be an emergent rather than a fixed property of systems. They also suggest – albeit briefly – some of the ways in which users actively sought to make systems usable. While we would argue that in every case users actively engaged with IT systems and the usability problems posed, there were striking variations in user stances towards usability issues. This can be illustrated by contrasting two groups of
users at two different sites. Staff in Brodies’ stores worked hard to overcome the many usability problems they initially identified with the Staff Organiser. Associated with this was the common belief among users that usability problems were the result of poor use rather than a reflection of inherent inadequacies of the system. In contrast at Bancroft, faced with similar usability problems, academic secretaries used MAC as little as possible and continued with existing systems. These contrasting attitudes are not due solely to differing technical capacities of the systems. Instead they reflect the different dynamics and contrasting group identities within the organisations. These are issues that we now wish to explore further through a discussion of the development of the utility of the various IT systems in the three different organisations.

**Developing Utility**

The embedding of technologies into organisations involves the development of utility values as well as usability values – users must come to see the system as useful as well as usable. Making the system usable is not enough - for most users - if the system is to become an everyday and valued part of the organisation. As Table 4 illustrates, utility and usability can be seen as related elements of the user-technology relation. As with usability, our analysis suggests that utility is not simply embodied and pre-existing in systems when they ‘go live’ but is developed by users in their organisational setting. Users spend considerable time looking for and developing uses for their systems. In this, there is a degree of linearity in the development of usability and utility – in some ways making the system usable is a necessary precursor to making it useful. However, we do not assume that there is a simple transition from usability to utility. Firstly, not all users automatically make a transition towards developing utility: making it usable is enough. Second, users’ perception that they will be able to benefit from the technology encourages them to put the work in to make it usable. Similarly, experimenting with finding a way to make it usable may lead to them finding new ways that the system can be useful.
<table>
<thead>
<tr>
<th>Table 4 Usability Value and Utility Value</th>
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<tbody>
<tr>
<td><strong>USABILITY VALUE</strong></td>
</tr>
<tr>
<td>CHECKABILITY</td>
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<tr>
<td>CONFIDENCE</td>
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<tr>
<td>CONTROL</td>
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<tr>
<td>EASE</td>
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<tr>
<td>SPEED</td>
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<tr>
<td>UNDERSTANDING</td>
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</table>

While those who are behind the system will have their own ideas about what it is for, and this will provide an important influence, utility like usability is developed by users through their use of the system. Examination of users’ understandings, expectations and evaluations of systems revealed in interviews indicate considerable variations in the extent to which they were able or willing to a) move beyond the pursuit of usability to voice demands for a ‘useful’ system and b) to develop an account of utility that was distinct from that promoted by system sponsors. Related to these differences, there were also differences in the extent to which these accounts fed into the overall development of the system.

Some of these variations will be further explored in the discussion below that contrasts the experiences of three groups of users – one drawn from each of our research sites. These groups have been selected in order to typify three different stances towards techno-organisational change. These different stances reflect the fact that these three groups had different forms and levels of resources available that could be mobilised during techno-organisational change. The comparative success of the different mobilisations indicate important ways in which inequalities develop within the process of innovation.
Doctors - Privileged participants
Doctors at Finlay Hospital typify users who are able to articulate expectations and evaluations of system utility and have those expectations and evaluations responded to by system sponsors. During the specification and implementation of PBS, system sponsors recognised the importance of getting doctors ‘on board’ and worked hard to resolve the concerns they raised. This sensitivity to Doctors’ concerns continued after the system had gone live in the laboratories. These concerns increasingly focused on the issue of ‘validation’ – the ways in which doctors checked and approved test results before they left the laboratories. Doctors raised doubts about both the usability and utility of PBS. According to the doctors the introduction of PBS complicated validation by making it more time consuming and tedious. These worries about the usability of the system were linked to broader concerns relating to the extent to which the operation of the system might prevent them from exerting proper control over the validation process.

What is notable is that while the concerns of other users, notably the MLSOs, were often sidelined by system sponsors, ‘problems’ identified by doctors were responded to. Changes were made to PBS and associated procedures were introduced that made it both quicker and easier for doctors to use and gave them more control over validating samples and the work of the lab. Doctors were, therefore, able to participate actively in the process of innovation, to a large extent, on their own terms. This is not to say that all their ‘problems’ were resolved.

While Doctors had a degree of influence over the development of PBS they were not free to shape the system in their own image. PBS was primarily a management-sponsored system and doctors’ participation in its embedding in the organisation was partly defensive. Despite the few benefits they could identify in the system a number of factors meant that they could not simply remain detached from the system and refuse to participate in attempts to integrate it into the lab. The nature of the data going through the system - results to tests for serious illness and disease – meant that the doctors felt a need to monitor and improve the data handling of the system. Participation was also important to maintain medics’ legitimacy within the hierarchies of the laboratories and the wider hospital. It is striking that medics actually conceded a number of changes to their working routines and, in some ways, shifted their relationship to test results in order to retain areas of control they believed vital to their professional power. Equally while doctors continued to doubt the utility of much of PBS from a medical perspective, they were obliged to acquiesce to the management perspective of the system as another element of what they saw as the ‘intrusion’ of performance management into their medical practice.

Doctors did not have the opportunity to absent themselves from the changes taking place. But they were able to participate from a relatively privileged position. This position rested on the ownership of professional knowledge secured beyond the organisation and seen as valuable within it. Ultimately any successful implementation would depend on some sort of accommodation with this powerful resource. Doctors’ professional position gave them both a) a distinct space and set of criteria through which to develop their own evaluation of the system and b) the expectation that it would be
responded to. Their position also meant that doctors could participate in the development of the system and still retain a sense of distance from it. Thus in later interviews doctors could still express doubts about the overall utility of PBS from a medical perspective.

**Supervisors - Compelled participants**

Like the doctors at Finlays, Brodies’ store supervisors can be viewed as active participants in techno-organisational change. The position from which they did this and the consequences of doing it are, however, quite different. The introduction of the Staff Organiser into Brodies stores was a difficult one. Initially many supervisors questioned both the practicability and desirability of a staff planning system as centralised and inflexible as this one. They doubted both the usability and the utility of such a system. As already suggested, despite these doubts and the potential threat of the system to their autonomy and claims to specialist local knowledge of store life, supervisors worked hard to increase the effectiveness and acceptance of the Staff Organiser in stores. They did this by both amending system plans to make them workable in the store setting and by co-operating with outside experts to improve the model of store life held in the system.

A striking finding from our return interviews with supervisors was the way in which their use of and attitudes towards the Staff Organiser changed over the time of our study. Over time supervisors began to use the Organiser to dictate staff activity and worked to ensure that staff did what was laid out on the plans. While supervisors had initially amended and manipulated the reports and performance indicators generated by the Staff Organiser, over time these became central to their understanding of the ‘efficient’ running of the store. By participating in the improvement of the working of the system, supervisors had been drawn into its broader logic. As such they came to see the system as useful in terms largely set by system designers and sponsors.

A number of factors help to explain supervisors' eventual acceptance of the Staff Organiser. Firstly they did not have the resource of delocalised knowledge and professional status that doctors at Finlay had. This made it harder to promote and secure an interpretation of the Staff Organiser or the organisation distinct from that of the system sponsors. Secondly, supervisors must be located in gender relations within and beyond Brodies. Supervisors were mostly female and middle aged. Local gender norms and assumptions which developed in the retail setting of Brodies merged with wider social narratives that cast doubt on the abilities of women to use complex technology and created a focus on their use as a potential obstacle to the successful implementation of the system. Rather than questioning the assumptions embodied in the system, supervisors worked hard to prove that they could get the system right. In the process it was hard to hold onto evaluations and understandings of the utility distinct from those of the system sponsors or to articulate needs distinct from those of the organisation as a whole.

Supervisors’ contact with the Staff Organiser was, therefore, highly regulated at both an organisational and at a subjective level. Supervisors worked to develop utility in the Organiser because they were in some sense compelled to do so and because the opportunity to reject the system was not open to them. This is not to say that supervisors had no agency. In a relatively powerless position in an organisation with much regulatory
power there were significant benefits to working with the system and supporting organisationally approved definitions of what made the Organiser useful. The Staff Organiser was one of a raft of changes in Brodies disrupting the old ‘family’ store culture. These challenged the Supervisors existing role that had been based on their local knowledge of stores and a firm but maternal relationship with ‘their girls’ – many of whom they had worked with for years. In an increasingly managerialist environment the Organiser became a potential resource in securing the supervisors’ position. The ‘rational’ impersonal plans of the Staff Organiser were, for example, particularly useful for dealing with the growing numbers of transitory part-time and temporary workers that Brodies employed. In the context of a changing organisation, the Staff Organiser could become increasingly useful to supervisors. Supervisors also came to see expertise in the Organiser as important to future promotion and status in the stores. Adoption of the logic of the system and association with it was part of a shifting role – from being a buffer between management and ‘their girls’ to acting as management intermediaries.

**Academic secretaries - Empowered non-participants**

There are some parallels between academic secretaries at Bancroft and supervisors in Brodies. They were mostly female and relatively low in the hierarchy of their organisation. It is striking, however, that secretaries adopted quite a different position during the introduction of the MAC system.

Secretaries consistently voiced doubts about the value of the system. Much of this doubt was articulated in terms of MAC’s lack of utility for their own work. They acknowledged that the system might have utility – particularly in relation to control and understanding of the organisation - for central management. They could see that the centre would benefit from detailed up to date records of student and budget matters in the new climate of academic and management audit which the university now had to comply with. However, there appeared little in the organisation to compel them to help produce a system capable of meeting management needs and goals. Secretaries made limited use of the system and kept separate records outside of MAC, limiting its effectiveness as a management information system. While Brodies supervisors felt compelled to develop the usability and utility of the Staff Organiser, at Bancroft it was the system sponsors who had to work hard at trying to produce a system which secretaries would find useful. They did this primarily by introducing a separate system called the Data Warehouse that sat alongside MAC and made information retrieval and manipulation easier and seem more relevant to the concerns of secretaries. It was hoped that improvements to the Data Warehouse would enable the secretaries to think of Data Warehouse and MAC as together providing a single service that was useful to them. Even so, secretaries remained sceptical about the utility of MAC for them.

What factors framed secretaries’ distance from the process of innovation and enabled them to maintain their own account of utility? Their apparent distance and non-involvement reflects significant aspects of their position, the organisation and the technology. Secretaries were important to the success of the system: to produce the types of utility sought by the centre the secretaries had to keep information about students such as course options, personal tutor and registration for examinations up to date in the system. Arguably a similar point could be made about Brodies supervisors.
and the Staff Organiser. However, other aspects of the secretaries’ position meant the engagement between users, sponsors and technology took a different form in Bancroft. The organisational structure and culture stressed decentralisation and departmental autonomy and this left space for secretaries to refuse to work to shape utility in the system. In Bancroft the academic departments had an established sense of autonomy and decentralised power that was secured in the structure of the organisation and the professional identity of academics. Secretaries saw themselves as accountable to academics in their department: not those at the centre sponsoring the system. Since the academics shared the secretaries’ misgivings about MAC, this organisational autonomy gave the secretaries the chance to ‘opt out’. These factors help to explain why secretaries were able to articulate a consistent and particular account of utility values and why the sponsors of MAC had to respond to that.

Discussion

This paper supports our contention that the usability and utility of technological systems are not inherent to the technology but emerge as systems are integrated into particular organisational settings. As such new users are crucial to the development of new systems – they are actively involved (even if the ‘activity’ may actually be a form of sceptical non-involvement). The three cases explored above by no means exhaust the variety of different stances towards technological innovation found amongst users. They do, however, illustrate something of the variety and complexity of these stances - how different user groups come to value a technology in different ways and under different terms. Although this is not made explicit in the above examples, as we show elsewhere (McLaughlin et al 1999) this variation takes place within as well as across organisational settings.

This suggests a new angle on the inequalities of technological innovation. We can see inequalities in both the extent to which groups are able to express and maintain their own distinctive account of value and the extent to which they are able to voice and promote usability and utility issues. It is striking how much users’ technological evaluations and needs are influenced by their position in the organisation and their membership of particular occupational groupings. Group identities became more important at moments of techno-organisational change. Here it is not just a question of how users’ positions influenced their definitions of technological usability and utility; utility in particular supported and secured their membership of particular groups in a changing organisational environment.

Whether users articulated utility in reference to group or organisational needs was an indication of the relative strength of resources available to groups based in factors such as knowledge and expertise. At the same time how group and organisational constructions of need influenced their decisions and were played out in the 'final' technology gave further evidence of the inequalities and power relations that were part of the process shaping the technology and its users. Ways in which certain groups of users were able to participate - or not participate - and incorporate - or not wish to incorporate - the technology is a telling guide to the relative autonomy and strengths of different groups in organisations. As our examples illustrate this is not, however, simply about the replication of occupational divisions and inequalities. It is important to consider users as
active, as well as constrained, in seeking to turn use of the system into a resource that can help them secure their position and identity within and beyond the organisation. The development of utility can be implicated in shifting patterns of occupational identity and organisational power relations and practices. Inequalities are part of the context of innovation, but do not remain unchanged by the processes they influence.

In considering user involvement in techno-organisational change, we must also be careful to not associate participation with power in a simplistic fashion. Participation is bounded and regulated at a number of levels and users bring varied resources to the process. The decision not to be involved in integrating a new technology into an organisation can be evidence of the security of other resources that continue to sustain a group's position. It can also result from a lack or failure of forms of regulation to compel users to shape the technology. These different levels of involvement indicate the influence of various organisational factors in shaping techno-organisational change. The place of users in the organisation, their associated construction or ownership over different areas of knowledge, and identities and norms developed in the local setting and wider context, will influence whether reaching a usable and useful relationship with the technology is important to them and to the organisation.

Once technology becomes an integral part of staff promotion, once performance contracts reflect targets and values within the system, users can feel little option but to be actively involved in turning the system into a ‘useful’ tool. Therefore, at least some of the utility that users find for technology flows from the patterns of regulation they are part of. It is important to be aware of ways in which users or groups can be compelled to search for utility in a technology and in their use of it. Participation in the embedding of technology into the organisation may be evidence of users’ recognition of the privilege given to the technology and associated management priorities. Analysis of regulation also involves wider context as well as local setting. Norms and assumptions about the role and benefits of technology (Rachel and Woolgar 1995), gender (Acker 1990) and forms of knowledge (McLaughlin and Webster 1998) can play a role in enabling and limiting the forms of participation that users undertake.

In understanding what informs the development of utility the goal is to see the emerging utilities as products of the strategies and negotiations that users are participants in. These negotiations are attempts to retain or obtain power and position in the organisation and help explain the labour undertaken to integrate new technologies into the organisation. To consider how these strategies and negotiations influence the outcomes of innovation it is important to be sensitive to the extent to which different user groups’ usability/utility needs are recognised by system designers and sponsors and are able to exert an influence over the final shape of systems. While it may be possible to talk about the stabilisation of technologies over time in particular settings and while different groups may contribute to that stabilisation in different ways, it would be wrong to exaggerate the extent to which this involves an unproblematic alignment of different understandings of usability and utility.
Bibliography


