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Developing Usability and Utility: A Comparative Study of the Users of New IT

JANICE MCLAUGHLIN & DAVID SKINNER

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 must incorporate new systems into their working lives and in so doing play a crucial and active part in embedding new systems into organizations. The particular focus of this paper is the interplay of two key aspects of the varied and developing relationships between users and new systems—usability and utility. By classifying discussions of usability into six distinct components, the paper recasts it 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 research site. Each group is taken to exemplify different locations in and stances towards processes of techno-organizational change.*

Introduction: Users, Usability and Utility

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 and managerial objectives as the simple drivers of organizational change.[1] This move rests on the basic but important premise that technologies are social and political products. Discussion of 'social shaping' has, however, focussed largely on the design of technological systems. Now there is a growing interest in what happens when and after a technology is introduced into a workplace.[2]

In particular, the drive is to establish how the peculiarities of specific organizational settings influence the use, character and impact of even apparently similar technologies.[3] Various writers explore factors that enhance or inhibit organizations' capacities to be effective acquirers and users of technology.[4] In such analyses innovation is recast as contingent, local, unpredictable and as taking place over an extended period of time. Arguably, however, the implication of this insight—that end-users are active participants in the innovation process—has yet to be fully explored.

Our own work has focused on what remains to be done when new IT systems 'go live'—the crucial part played by end-users in embedding technology into organizations. Something of this is captured in Fleck's[5] notion of 'innofusion': this stresses the 'mutual

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adaptations' that occur once technology arrives in an organization. Similarly Orlikowski[6] suggests that when technology first enters an organization 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. Therefore, innovation is a socio-technical process rooted in the specifics of a particular setting.[7] Users participate in developing new organizational, occupational and technological roles and relationships. This involvement is however framed by factors within and beyond the organization such as patterns of power and status, and dynamics of regulation and knowledge.

This paper explores the place of end-users in techno-organizational change by focusing on two basic but fundamental issues—how systems become useful and usable. In conventional accounts of innovation (and within management circles) the need for, purpose of and potential benefits of a new system are (or should be) clearly resolved prior to its implementation and, indeed, drive that implementation. It follows that ensuring the usability of systems is largely a technical problem of design and training. Both these assumptions are, however, highly questionable. As other detailed studies of innovation management have shown, the purpose and form of systems can remain unstable and contested despite the decisions of designers and sponsors. In addition, end-users are not merely the passive recipients of new systems but must, to a greater or lesser extent, be enlisted in making technology workable in the organizational setting.

The discussion that follows, rooted in three detailed case studies, considers how and why end-users come to see systems as usable and useful. It offers an account of usability that encompasses much more than the notion of an 'easy' 'user-friendly' system. It also highlights the complex interplay between the development of system usability and utility amongst users: while the potential for value may encourage users to engage with systems, utility emerges out of that engagement and often only after users have been involved in a pursuit of usability.

Throughout our analysis the emphasis will be on the differences between groups of end-users within and across organizations in their understanding of and priorities towards usability and utility. Exploring innovation, therefore, involves consideration of two related but distinct levels of analysis—the ways that differently placed users find value in a system and the ways that the various user constructions feed into the eventual stabilization of that system within an organizational setting. While the intentions of management sponsors frame that stabilization, distinct needs and uses—valued by both end-users and sponsors—emerge in the processes of innovation and use.

The Case Studies: Bancroft, Brodies and Finlay

The paper is based on data drawn from a recently completed ESRC funded research project[8] that involved studying the implementation of new IT systems in three, contrasting organizations—a university, a national retailer and a group of hospital labs. To protect anonymity each has been given a fictitious name (as has the IT system in two of the cases). We conducted 190 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 organization 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 organizational 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; 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 1200 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. In common with many retailers, the hierarchy in Brodies is gendered. In large stores the (male) manager works with a mostly female management team. The link between management and the shop floor is 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 15-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) that were part of a wider group of laboratories purchasing the IT system. Microbiology provides clinical and other microbiological services principally associated with testing hospital and GP patients' samples.

We have called the IT system at Finlay the 'Patient Based System' (PBS). PBS—much like MAC—is a modular system. 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. The sponsors of the new systems understood these problems of usability primarily as technical ones—typically the issue was framed in terms of making the system 'user friendly' and/or providing further staff training. Interviews revealed that for users, usability encompassed much more than this. In the light of these interviews we broke usability down into six related but distinctive components summarized below.

Checkability: The system has or allows checks that ensure the correct information is going in and going out of it.
Confidence: Users have confidence both in their capability to use the system and in the system itself.
Control: Users have control over the operation of the system, particularly of the information fed into and out of the system.
Ease of Use: The system is easy to use.
Speed: The system can be used quickly.
Understanding: The system and its outputs are understandable.

We do not claim that this is a definitive list or one with universal application. By analysing and categorizing 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) organizational roles, practices and cultures. In addition, there are two striking elements of our analysis of interview data on usability: first, the extent to which users' evaluations of systems' usability developed over time. 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 organization and the terms under which they came to be users. Second, users' interpretations of and priorities towards usability significantly varied according to occupational role. For example, in the main it was intermittent 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.

These points can be illustrated by the understandings of usability articulated by different groups at Finlay as summarized in Table 1 (a wider discussion of the development of usability in all three sites can be found elsewhere[9]).

In Finlay, *ease of use* was rarely a strong theme in our initial user interviews. 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' samples, ensuring the system was *checkable* was a major concern. There were also striking variations in perceptions of and priorities towards usability. For example although scientific officers who conducted

Table 1. Usability at Finlay by job grade

	Doctors	MLSOs, MLSO2s and clinical scientists	Trainee MLSOs	Laboratory aids/ clerical officers
Checkability	Important and questioned	Concerns with how checkable PBS is in comparison to paper	Believe it to be checkable	Want the system to be checkable, believe that it is
Confidence	Growing from a shaky start	All have had to develop this, CS's having the most difficulty	Have developed a confidence with what they do with it	Still being developed, shaky in some areas
Control	Question over their control of the system	Feel controlled by the system	Sense of training being controlled by system	Some concern with being controlled by it but not to a significant degree
Ease	Easy to use, but find that it does not fit easily into their job	All see it as an easy system–easier than the previous system	System is seen as very easy, more so than the previous system	System is seen as very easy to use
Speed	Takes time away from their 'real' role	Find the system quick when they are using it day to day	System is seen as considerably quicker than previous system	System is seen as considerably quicker than previous system
Understanding	Growing, but still limited, would like more understanding	Happy with a limited understanding	Happy with a limited understanding	Still building their limited knowledge

tests on samples (MLSOs) had to spend a bigger proportion of their day using PBS than doctors did, they found the system quick while the doctors found it slow. This variation was as much about professional identity as it is about the emerging qualities of the system. Attitudes related to the different value the groups placed on the time spent using the system: while PBS was an unavoidable and significant aspect of the MLSOs' work in the laboratory, for doctors, time on the PBS was perceived as time taken away from their 'proper' role.

Constructing Utility

While issues of usability were prominent in our initial round of interviews, when we re-interviewed a sub set of users at each site three and six months later, it was notable that these concerns had—to a greater or lesser extent—been superseded by others around the utility or usefulness of the system. This shift reflects—again to a greater or lesser extent—the incorporation of the systems into the working lives of end-users. The transition from the pursuit of usability to the development of utility is represented in Table 2.

The transition from the development of usability value to utility value is a strong finding and one that challenges much conventional wisdom that assumes that the (management) definition of clear needs and utilities both precedes and is a precondition for the development of a usable system. On the contrary, many of the users we studied came to find systems useful through an engagement with the problem of making the system usable.

Our analysis of the transition from usability to utility obviously raises questions about the relationship between the incorporation of technology by various groups and a broader process of embedding the system into the organization. It is worth reiterating, however,

Table 2. Usability and utility

	Usability value	**Utility value**
Checkability	Users feel the system has enough safeguards to make it safe to use	The system is used to check information and to check on the organisation
Confidence	Users have confidence in the system and their use of it	Users have confidence in the system to change things in their organisation
Control	Users feel that they have control over the system	Users use the system to control their immediate organisational environment
Ease	The system is easy to use	The system makes work easier
Speed	The system is quick to use	The system makes work or reaching decisions quicker
Understanding	The system is understandable	The system is used to make things understandable

the significant variations that exist between user groups in their relationships towards techno-organizational change. These variations can be mapped along multiple axes:

- Variations in user understandings of usability and utility.
- Variations in the extent to which users saw system utility as well as usability as important.
- Variations in the extent to which users developed evaluations of technology that were distinct from those promoted by system sponsors: to, for example, articulate needs distinct from the needs of the organization.
- Variations in the extent to which users felt compelled or enabled to participate actively in the innovation process.

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 difference stances towards technological change.

Finlay 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 recognized 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 a problem with how the system dealt with the validation of test results—a key aspect of the doctors' role in the laboratory. Doctors raised doubts about both the usability and utility of PBS in this area. 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—a utility issue.

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. Despite the few benefits the doctors could identify in the system—for them—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 doctors' legitimacy within the hierarchies of the laboratories and the wider hospital. It is striking that doctors' 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 organization 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.

Brodies Supervisors—Compelled Participants

Like the doctors at Finlays, Brodies' store supervisors can be viewed as active participants. 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 centralized and inflexible staff planning system. They doubted both the usability and the utility of such a system. Despite these doubts, 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 quite markedly. Over time supervisors began to use the Organiser to dictate staff activity and to work 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. 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. First, they did not have the resource of delocalized knowledge and professional status that doctors at Finlay had. This made it harder to promote and secure an interpretation of the Staff Organiser, the organization or utility distinct from that of the

system sponsors. Second, 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 utility distinct from those of the system.

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 organization with much regulatory power there were significant benefits to working with the system and supporting organizationally 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 not only challenged the supervisors' existing role that had been based on their local knowledge of stores and a firm, but also their 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. Supervisors also came to see expertise in the Organiser as important to future promotion and status in the stores and thus it made sense to work with the utility needs set by the sponsors.

Bancroft 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 organization. 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 organization—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 organization 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 and improving 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. 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 organization 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 organizational structure and culture stressed decentralization and departmental autonomy and this left space for secretaries to refuse to work to develop utility in the system. In Bancroft the academic departments had an established sense of autonomy and decentralized power that was secured in the structure of the organization 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 organizational 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 and why the sponsors of MAC had to respond to that.

Discussion

Our contention is that the usability and utility of technological systems are not inherent, fixed technical features but instead emerge as they become part of everyday life in particular organizational settings. As such new end-users are crucial to any process of techno-organizational change.

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[10] this variation takes place within as well as across organizational settings.

The acquisition, design and development of systems prior to implementation is of course also a process of utility construction involving negotiations around notions of organizational need, functionality and user-friendliness. What is striking from our case studies is not only the way users develop their own evaluations and utilities distinct from those of management sponsors, but also the ways in which those user evaluations can feed into (changing) sponsor understandings of the system and influence how such systems are stabilized across an organization. In understanding this it is important to be sensitive to the extent to which different user groups' definition of need, usability and usefulness are recognized by system designers and sponsors.

The ways in which certain groups of users were able to participate—or not participate—and incorporate—or not incorporate—the technology is a telling guide to the relative autonomy and strengths of different groups in organizations. As our examples illustrate this is not, however, simply about the replication of occupational divisions. 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 (changing) organization. The development of utility can be implicated in shifting patterns of occupational identity and organizational power relations and practices. Similarly, inequalities are part of the context of innovation, but do not remain unchanged by the processes they influence.

Once, for example, 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 organization may be evidence of users' recognition of the privilege given to the technology and associated management priorities. Analysis of regulation also involves the wider context as well as the local setting. Norms and assumptions about the role and benefits of technology,[11] gender[12] and forms of knowledge[13] can play a role in encouraging and limiting the forms of participation that users undertake.

In considering user involvement in innovation, we must, therefore, 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 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.

Our analysis has a number of implications for the management of innovation and, indeed, the use of technology as a tool of management. A 'successful' implementation of new technology requires users to be enrolled into the process of techno-organizational change and implicated in the development of systems that are workable within a particular setting. As such, users must come to see and/or actively develop systems as usable and, in many cases, as useful. This evaluation and construction of usability and utility may be bounded and regulated by designers, sponsors and managers but ultimately it emerges out of users' own distinctive and varied positions and experiences.

During the design and implementation sponsors may seek to establish and maintain clear objectives, roles and functions for a new system. To pretend, however, that these are unambiguous and uncontested or that they will remain unchanged by the meeting of system and setting may be counter-productive. The stabilization of a technology across an organization will require some sort of accommodation with the values of differently placed users. Although systems may be part of attempts to manage and control an organization, they must be flexible enough to be incorporated into the varied outlooks and projects of those differently placed users.

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