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Focus Issue on Legacy Information Systems and Business Process Change: Banking on the Old technology: Understanding the Organisational Context of 'Legacy' Issues

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**LEGACY INFORMATION SYSTEMS
AND BUSINES PROCESS CHANGE**

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ABSTRACT

A common thread in recent discussions of organisational change is the importance of the role allocated to information technology in the realisation of such change. It is a feature of many of these discussions that IT is handled in a somewhat simplistic fashion, often with a pronounced theoretical leaning resulting in "the case of the disappearing technology". Even empirical studies of new technology often fail to pay attention to the actual details of technology in use, instead focusing upon the part technology might play in producing certain managerial or workplace configurations that are themselves theoretical renderings of organisational life.

By way of contrast, this paper presents some results from a long-term empirical investigation of computer systems in use in financial services that specifically aims to focus upon the actual details of technology in use. In addition it attempts to address conventional concerns with the relationship between new technology and 'skill', productivity and other factors in a rather different fashion by focusing on the issue of 'legacy'. We present a number of examples of legacy

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issues and try to delineate their impact on everyday working life. 'Legacy', we argue, is not just a problem encountered by organisations with aging mainframes and dated software, it is an issue from the moment a computer system becomes an integral part of any organisation's everyday work.

Keywords: Legacy; technology; ethnography; financial services; organisational change**.**

I. INTRODUCTION

A longstanding preoccupation of academic and other interests in contemporary organisations is the attempt to situate and understand organisational change as a response to what are seen as major transformations in the social, economic and technological environment in which organisations operate[1].[Nonaka and Takeuchi 1995] Information technology is frequently seen as a key element in these changes, especially IT systems that can facilitate the co-ordination and communication of decision making, and support skill and knowledge [Scott Morton 1991; Zuboff, 1988]. Collaborative work, a central feature of organisations, is increasingly electronically supported [Grudin, 1990], and distributed computing is widely accepted as an increasingly important feature of work in a variety of domains [Robins, 1992]. In financial services, for example, Channon [1998] charts the developing impact of IT facilitated reorganisation of retail banking services and the introduction of information and communications

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[1] Although there are various diagnoses of these changes [the Labour Process Debate being one obvious approach but see also, for example, Lash and Urry, 1987; and Hammer and Champy, 1993], some common themes emerge both as issues for theoretical investigation and as practical strategies for organisational change. Alongside the particular emphasis on IT in supporting new organisational forms for the coordination and control of work, these themes include: 1) the need for a greater reliance on knowledge creation and conversion; 2) the decentralisation of organisational structures; 3) the creation of more flexible patterns of intra- and extra-organisational relationships; 4) the development of a workforce which is not only more empowered but also imbued with a commitment to organisational goals; and 5) increasing organisational responsiveness to the consumer.

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technology [ICT] driven delivery systems such as ATMs, telephone and Internet banking. He suggests that;

"after half a century of relative stability information technology was a major contributor to transforming and forcing convergence of what were previously a series of segregated industry segments .... organisations that wish to survive and prosper in a rapidly changing environment must look further than the narrow confines of their traditional operations and open their eyes to a broader horizon in which information technology is a key driver of corporate strategy."

Despite this increasing emphasis on IT, most attempts at understanding 'technology in use' are strongly theoretical, leading in many instances to what Button [1993] calls "the case of the disappearing technology". Even empirical studies of new technology [Knights & Willmott 1988] often fail to address the details of technology in use. Instead they focus on the role of the technology in producing particular managerial or workplace configurations, which are themselves derived from generally theoretical treatments of organisational life. As Button comments:

"The general run of sociological interest in technology is said to be less concerned with questions concerning the constitution and organisation of technology than it is with using technology as a platform from which to observe the constitution and organisation of the structural arrangements of society.... instead of examining what it is about human activity and human interaction that makes technology the recognisably distinct phenomena it is understood to be by those who design it, make it, use it.... an analysis of the posited shaping forces can end up taking precedence, and technology itself can thus become merely another incidental arena in which to observe them at work."

This paper presents results from a long-term empirical investigation of computer systems in use in financial services. It addresses conventional concerns with the relationship between new technology and 'skill', productivity and other factors in a rather different fashion to that conventionally followed, by focusing on the issue of 'legacy'.

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Computer systems have been installed in many companies for some time now and no matter how well they may have fitted the situation initially, usage and the circumstances of use have changed, as indeed have the needs and the users, and, most importantly, the organisations themselves [Henderson & Kyng 1991]. Although brought to the foreground of public attention by recent concerns surrounding the 'millennium bug' (and more recently the 'Euro'), legacy issues have a far wider organisational purchase and relevance. These issues emphasise the idea of IT as constraining various kinds of organisational behaviour and activities, constraints that need to be skilfully negotiated by those at work. (In many ways, despite the hype and publicity, the 'millennium bug' can be viewed as a relatively 'straightforward' legacy issue). A number of examples of legacy issues and their impact on everyday working will be presented which indicate that 'legacy' is not merely a problem facing organisations with ageing mainframes and dated software. The rapidly changing nature of commercial and organisational life means that legacy issues can arise relatively soon after the introduction of comparatively new technologies. Moreover it would seem that that an appreciation of legacy needs to move away from a purely technological stance to admit the importance and impact of organisational issues. In brief the suggestion is that understanding 'legacy' and its impact on business 'processes' and everyday working may require a nuanced view of various factors, including working practice, communication and control problems, and indeed any number of complex articulations of structure, process, technology, and 'situated' knowledge.

II. METHOD - ORGANISATIONAL ETHNOGRAPHY

The research reported in this paper draws on a long term ethnographic study of financial services in a major 'high street' bank. The main characteristic of the 'ethnomethodologically informed' ethnographic approach employed is the detailed observation of practices, conversations, and activities. The emphasis here is upon furnishing a 'thick description' of the routine, everyday practical

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accomplishment of the work; the 'routine' problems and contingencies that 'typically' arise and are overcome and accommodated; and the various forms of team working that combine to enable the work to 'get done'.

As befits it's origins in ethnomethodology, this particular 'take' on understanding work emphasises how work is socially organised - how individuals are enabled to work because of their awareness of what constitutes their 'task' and how it links with the tasks of others. This focus on the 'situated' character of work and the related judgements and discretion routinely displayed in response to everyday contingencies, provides a method for identifying the subtle, often un-remarked, co-operative aspects of work. Cooperation can include things such as the small-scale constellations of assistance and deployment of local knowledge that enable work to be accomplished.

Ethnographic methods involve, therefore, far more than 'mere' detailed description [Button and King 1992; Hughes et al. 1994]. Rather they bring a particular focus to the analysis of systems in use and thereby outline the 'play of possibilities' for work and design, "enabling designers to question the taken-for-granted assumptions embedded in the conventional problem-solution-design framework" [Anderson 1994, p. 170]. It is in these senses that ethnography can perhaps be understood as a 'bottom up' method for re-specifying and developing a more sophisticated view of business processes. Our argument is that the descriptive and analytic techniques to be found in ethnographic approaches provide an alternative way of asking questions, or of 'respecifying the problem' [Randall et al, 1992].

III. BANKING & THE NEW TECHNOLOGY: IT SYSTEMS IN USE.

".. IT will turn .. services from highly labour intensive, paper shifting, minimal technology activities into fully-fledged tertiary mechanised industries, with massive leaps in labour productivity in a comparatively short period of time - hence the analogies which some writers draw with the Industrial Revolution.." [Prandy et al 1982]

"Banks are dinosaurs ... we can bypass them" [Bill Gates, 'Newsweek' 1994]

"Something else we may have to wave goodbye to is the bank as we know it, already on its way out and predicted to vanish in the next 30 years,… " [Mathew Sweet, 'Independent on Sunday' 1997]

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Castells [1996] in his vision of an 'Information Society' suggests that: "The maturation of the information technology revolution in the 1990s transformed the work process, introducing new forms of social and technical division of labour. "…By the mid-1990s the new informational paradigm, associated with the emergence of the network enterprise, is well in place and set for its unfolding" [Castells 1996, p. 240]. However, as anyone who ever bought a 'Sinclair C5' electric 'vehicle' might ruefully admit, technology is often the subject of quite unreasonable 'hype'. Information technology, as the quotes above indicate, is frequently the subject of quite unrealistic expectations. This certainly seems to be the case in banking. Financial institutions were among the first wave of business organisations to computerise many of their operations. A great deal of their basic functioning is now dependent on those aging systems. Scenarios of 'off-planet' banking remain, of course, journalistic fictions. Videoconferencing, video booths, and Internet banking still all remain novel and underevaluated. However, financial institutions have long been in the forefront of the use of distributed computer systems. Recently they began to explore the increased use of networked IT to support decision-making, quality control and customer services [Channon 1998]. Alongside this change, various software packages and expert programs were provided for informational databases, risk grading, and decision making.

For the last few years, the bank that served as the basis for this research underwent major changes in its business delivery strategy with the aim of creating a more competitive organisation. These changes are heavily dependent on IT systems to facilitate decision making, co-ordination, and the flow of work. The point of this section, then, is to pay some attention to the technology and to highlight how these systems are utilised as part of everyday, routine work. The emphasis is also on 'new' technologies - on new 'expert' programs recently introduced into the bank. "Legacy" as an issue is easily identified with aging and creaking mainframes. However, we suggest that 'legacy' concerns arise quickly out of the organisational context of use even with the newest software packages.

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We found a number of new 'expert' software programs had been placed in the bank's specialised Centres. The GAPP (grading and pricing policy) machine, for example, was a recent addition to the Business Centre. The software on this machine came from their Regional Office and was used to calculate the 'Risk Grade' of Businesses. This software, in turn, influenced lending decisions and the pricing policy that should be adopted on a customer's business account. 'GAPP' had been introduced both to support decision-making and to improve the speed of processing thereby giving staff more time to be 'pro-active' - to develop customer relationships and sell bank products. The following extract shows a Business Manager's Assistant carrying out a 'GAPPing' exercise prior to a Business Manager's visit to a company:

> 1. Gets screen - 'Customer New Record' - fills in details from GAPP data input form (obtained from company's accounts)
> Screen 'Customise' - (name) - fills in details - date, account obtained etc
> 3. Screen - "Business Definition' - "What does pharmacist go under?" - discussion with other Assistants - "try that one" - clicks on various titles - "what's other?" - other small screens appear. - eventually finds it.
> 4. Screen 'Audited Management Accounts' - "do you put a minus in here if it's in brackets?" "Yes - it will print up then" - filling in details from form.
> 5. Screen - 'Management Details' - (series of questions - yes/no clicks) - management assessment; financial monitoring; trading environment; short term problems;
> 6. Screen - 'Facility Summary' - 'New Customer facility' - as each section of the screen is entered 'help/explanation' messages appear at the bottom of the screen
> 7. Prints out - 'Risk Analysis Summary - gives risk grade and ratings on facilities (what should be charged)

It is important to recognise that GAPP was simply an addition to the existing risk assessment and pricing 'devices' - in some senses merely automating what had previously been done (and continued to be done) manually. GAPP, then, contributed to an organizational legacy of both of 'checking' and of multiple data entry into systems that were unable to 'communicate with each other. The GAPPing procedure, although an integral and compulsory part of the lending process, often appeared as a mere additional check. This meant that GAPPing seemed less important as a decision-making device than as a 'security blanket' for decisions already made, and as a starting point for negotiation with

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the businesses concerned. As an Assistant Manager said; "you cannot say straightaway...just because the computer program says 1% higher...you can't just impose a 1% rise...You've got to use it as a tool.. You've got to sum up how much the overdraft is and whatever.." This position - of using the software to confirm rather than determine decisions - may have arisen as a consequence of the inclusion in the program of 'non-financial' information which could significantly influence the risk grade obtained. This information was dependent on the Manager's store of local and anecdotal knowledge e.g.: "are there any signs of creative accountancy?"; "are there any anecdotal signs of problems?"[2]. It may also stand as a reflection of managerial experience and scepticism about the information provided - an awareness of the variety of techniques that could be employed to disguise the 'true' nature of an account. It may also be bound up with the fact that much of the information used in the Bank had been gathered primarily for 'control' rather than decision-making. That is, it was gathered in a 'surveillance' rather than a 'decision-making' mode. Within the Bank in general, and the Business Centre in particular, there was an awareness of how accounts could be managed to misrepresent a business's trading position. There was similar scepticism about 'business forecasts' (especially when produced by the business itself). Above all, the point to make about the decision-making process and the usage of information (whether on paper or computer) is the need to appreciate the careful, and situated, consideration of the information. That is, it is not a question, as Harper [1989] points out in his ethnography of accounting, of 'just any old numbers'. Rather, interpretation of the information, and decision-making from the information, is dependent on certain, 'nuanced' expectations.

Another 'expert' program was 'TecSec', a system introduced into the bank's Securities Centre for taking and maintaining securities. For workers in the Securities Centre 'doing the work' involved a complex series of interactions

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[2] Such 'anecdotal' evidence should not, however, be sneered at since, in at least one instance - a double glazing firm - no indication of trouble was revealed by any of the computer packages or printouts. Problems only became evident when the firm appeared on the 'receivership and liquidation' perusal form and the Customs and Excise asked to be paid with a Building Society cheque...

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between themselves, other workers in the Branches, the software, and the paperware. Examples from the fieldnotes illustrate the variety of processes that 'typically' constitute such 'work'. They also serve to illustrate the intensity, the persistent checking procedures, and the largely computer-driven nature of much, though not all, of the work.

..4. Looking at 'Outstanding Worklist' - once keyed in computer immediately releases certain procedures - 'formalities' - certain questions. Gives questions on screen - Y or N answer
...
11. Back to main screen - 'Current Formalities' - more questions...
12. Checking that paper matches the screen.
13. Goes off & gets form. Formality has prompted him to go to Land Registry - to ensure no adverse entries on Land ... prompts what to put on the form -
 appearing on screen - "Complete the Application for a Search (K16) using these details" - gives address to send form to..
14. Fills in form as per screen ...
15. Goes back to screen - been given ref. no. - sends off to Plymouth to see if any adverse entries on the Land
16. Going through screen questions on Fire Policy - when answers questions screen comes up "releasing formalities"
....
20. On screen - "You have reached a checking stage: Now pass file to checker

Here, then, is another example of organisational rationales and behaviours whose 'legacy' has come to be partly embedded in the computer software and 'routinized' in workers' everyday interactions with it.

IV. 'DECONSTRUCTING 'LEGACY': THE ORGANIZATIONAL CONTEXT OF LEGACY ISSUES - EXAMPLES FROM THE FIELDWORK.

"The scenario is all too common: An application has served the business needs of a company for 10 or 15 years. During that time it has been corrected, adapted, and enhanced many times. People approached this work with the best intentions, but good software engineering practices were always shunted to the side (the press of other matters). Now the application is unstable. It still works, but every time a change is attempted, unexpected and serious side effects occur." [Pressman 1997, p. 790]

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The main 'workhorse' systems in use in the bank were two software packages: BAF, an accounting/bookkeeping package dating from the 1960s, that, "had bits bolted onto it"; and ISS, a more modern relational database (dating from the 1980s). Early fieldwork in the bank - where the systems were accessed via 'dumb' VDUs - suggested that, like other equivalent financial institutions, the available hardware was extensive and the software sophisticated. However, observation and conversations with users indicated a number of problems. The system as a whole, and both main software packages, were seen as 'dated', 'slow', prone to unpredictable breakdown, and not 'user friendly'[3]. All the specialised processing units experienced what seemed to be frequent problems with the computer hardware - put simply, they 'went down' or 'went slow' on a regular basis. Occasionally outages lasted for considerable periods of time and resulted in great frustration - "what can I do without a computer?" - and not a little ingenuity. Although all the centres were relatively new, the addition of extra machines onto the system seemed to lead to a gradual slowing down of response times and increasing difficulties in terms of logging in and processing. In the Securities Centre, for example, it was frequently the case that the last one at their computers was unable to 'log on'. Instead they were forced either to log on at a different machine and then transfer or have everyone stop work whilst they 'logged on' (on at least one occasion people were asked to put their hands in the air to 'prove' they were not working). The extract below, taken in this instance from the fieldnotes on the Lending Centre, illustrates some of the procedures (which became effectively a form of recipe knowledge) adopted in the face of machine failure:

1. Machine down...looking at printout..
2. Screen still down..."Someone dropped something on the cable"
3. 20 mins later..screen still down.
5. Machine goes down again
7. Goes to another worker's desk - logs into her screen (gone for lunch)
9. Assistant asks them to leave machine on so they can use it.

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[3]   Management also expressed the view that as far as management information was concerned, the system was of 'limited usefulness'.

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10. Controller - asking around office who's going to lunch (so they can use machines)
11. Tells Assistant to go to another desk..changes machines

These criticisms continued to be voiced, at least to some extent, with the updating of the system to a 'Windows' environment since this in itself failed to address the major concerns. BAF is regarded as a particular, and typical legacy problem. This problem is perhaps best illustrated by the 'problem of the phantom branch' related by one manager in a comment that resonates with Pressman's concerns:

" if you go and speak to our systems people they would say there are parts of the software that they still don't know how it works because the original inventors of the package have long left the Bank..now and again they still change parts of it and it has effects that nobody foresaw...there's a branch...which has been closed a long time but we have to keep it open because when they tried to close it in the Bank's books. the computer records..it threw all sorts of things out...and they haven't found a way yet of closing this branch out in the Bank's books ...the computer still thinks this branch is open on a daily basis"

Whilst this may appear an exceptional, if not ridiculous, example, essentially similar circumstances would arise on a regular (if not predictable) basis. The following is an extended extract from the field notes. Here a Manager provides a familiar explanation for the failings of the direct debit system on the newly installed retail banking platform. In so doing, the manager also indicates some of the organisational concerns and skills and training issues that arise as a consequence of technological legacy

Regular Payments screen - comparing screen to confirmation of customer's instructions -
Regular Payments Direct Debit ..- hesitates
SCM   We have a situation here...
Screen has originator as GE Capital Bank - letter says Dixons - correspondence to customer quotes Dixons and reference number - However only information bank has ..refers to GE Capital Bank

Discusses problems with Direct Debit system - Set up by two experts some years ago - No longer contracted to work for the bank - System now isn't user friendly - To put matters right would involve large resource and expense so they make do with what they've got

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.....
    Next spot check form

    SCM   we get situations where we get authorities (.) I mean this is erm
    AM(TS)   oh yes it's come up as Visa
    SCM   yeah (.) I mean this is the Co-Op Bank
    AM(TS)   Yeah the customer thinks he's paying the direct debit to the Co-Op Bank
    ...
    SCM   in a situation like this (.) if the customer comes on the phone and says 'I want to cancel my direct debit to the Co-Op' and they went through the screen (.) the first screen would be ((pointing to Screen)) Well, there's no mention of Co-Op there so they'll go on to the next screen ...There's no mention of Co-Op bank ...so they'll go on to the next screen ....There's no mention of Co-Op bank ((points to screen)) There's TSB bank (.) 'Are you sure you don't mean TSB? (.) No? (.) Well we go on to the next screen ... We:::ll we've got a Visa ...Now that might trigger something off the customer (.) erm (.) but it depends how it's handled by the TLO (Telephone Liaison Officer) (.) Now if it isn't resolved then ... the TLO will then make a Service Recovery Sheet .... So then we get passed the sheet to look into when really from the outset (.) if that information had been recorded on here ((points to screen)) it just wouldn't have been a problem

Another example of the way in which organizational factors impinge on what seems a straightforward technical or software issue became apparent in the concern over 'customer notes' and 'letter templates' on the ISS relational database. It is also informative regarding the way in which legacy issues emerge over time as a feature of organisational restructuring. The relational database was purchased in the 1980s prior to the massive restructuring of the bank and the change in focus from the administration of accounts to a new emphasis on sales and customer service. In these changed circumstances the field sizes allocated to customer notes (4 lines) and templated letters suddenly became inadequate for the amount of information the new emphasis demanded. Other problems with the database, as well as some of the tensions within the bank between centralising and decentralising tendencies, are revealed in the following extended fieldwork extract where a Mortgage Adviser, conscious of an impending mortgage initiative, was trying to get a customer base established. The Mortgage Adviser was unable to search the relational database actively to 'spot' potential customers (a service which was provided by Regional Office) but instead was obliged to develop and rely on a range of haphazard and time consuming search techniques.

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2. Discussion with Assistant Manager about building up a customer base from records; asking about the characteristics of the information available;
"Can I chase back in your records of what's been opened recently?...I want to see if they are in rented accommodation or with their parents...Also joint accounts with different names..they're usually saving up to get married" ?
3. -Looking at personal loans info...
"They used to put all personal loans in an open book. but now they dont..so I have to try and get the info another way...What there is is new personal loans but that's going to be very time consuming"
4. Scanning computer printout by age; she has just thought how to use the computer (printout).scanning by whether they are homeowners, tenants etc.
5. Phones upstairs to Lending - Explains the marketing effort - Asks to be notified if he comes across any examples of certain age living in rented accommodation.
6. Colleague shouts across, "Another one might be a change of address..when they tell us at the desk."
7. Goes to talk with colleagues about how she can search the database and which databases (printouts) would be most fruitful - asks how else she can scan;
8. Goes to ask about amendments file(s); how it works, whether it would be of any use to her.."to change address ..need authority form..There are two other questions on accommodation ..Picking up on that..The receptionists are trying to spot it...but I shall have a look daily"

These kind of problems are not, of course, unfamiliar in organisations which were at the forefront of computerisation and whose systems are rapidly nearing the end of their effective life. However, the point about some of the fieldwork examples above is that legacy issues have arisen on relatively new systems. The lesson to be drawn, perhaps, is that system development has now reached the stage where 'usability' issues need to be addressed more effectively than hitherto: one of the rationales behind the rise of CSCW. Thus, while it is certain that the hardware and the software can be considerably improved, the important issue to address is how well a system can be designed which 'resonates' with the actualities of the work.

There is an attempt in the specialised centres to develop the system in light of their experience in using it. However, of the 500 suggested modifications to the 'TecSec' software that emerged from the centres, they were told to "pick their top 30". A list of approved suggestions covering aspects such as 'diary entries', 'letters and reports', 'screens', and 'formalities', were then assigned a priority level according to the feedback received and a 'mark of difficulty' was assigned to each. This assignment was intended to reflect the complexity of any

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change or where a change, though relatively straightforward, would have to be made in many areas of the system to be effective. As one member put it: "..the difficulty is basically..talking and getting changes ratified by programmers. It's not just sophistication but also implications .... Apparently small changes may have major implications"[4]. This statement is not necessarily an indication of the unwillingness of those responsible for the development of the system to make appropriate changes. It is equally likely to be an indication of just how difficult it is to modify systems which are already in use and upon which the work depends, not to mention the problems of technical complexity. In significant respects, problems such as these are as much organisational as technological because they direct attention to the need to reorganise work and implement new technologies in a more integrated way. How to achieve integration is, in many respects, the Holy Grail of managing technological innovation. However, and more realistically, it is unlikely that any organisation is ever 'going to get it right' the first time. What it *does* suggest is the need for more effective monitoring of new technologies in their situations of use and developing effective mechanisms for involving users' experiences in development.

There are some more general issues here - and difficult ones at that. The issues are related to the implementation of technological change. No matter how promising new technologies may seem, the realities of their implementation are typically disruptive. They also involve huge overheads in respect of retraining and compensatory payments, not to mention the lead-times required for familiarisation of workers using the system. These problems arise whenever new systems are introduced, no matter how carefully the planning was done. No doubt such changes are difficult and complex regardless of the industry or enterprise in which they are implemented. Nevertheless, from the point of view

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[4] Examples of high priority, high difficulty amendments included improved cross-referencing facilities such as identifying automatically if a charge is taken over a property already held as security to prevent duplication. Medium priority, medium difficulty included the provision of a variety of 'warning screens' following various actions. Low priority, low difficulty items generally involved simple amendments to wording.

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of those who have to operate the new, and often incomplete, systems, it is nearly always an occasion for frustration and, at best, developing ways of getting around the problems it provokes.

V. LEGACY AND ORGANISATIONAL CHANGE - CONSUMER CULTURE AND 'LYING' TO THE MACHINE.

Organisational restructuring within the bank brought both an emphasis on a selling culture - 'turning tellers to sellers' - and a particular focus on customer service [King and Randall 1994]. This emphasis was reinforced not only by the introduction of sales targets, a 'mystery shopper' program, and customer satisfaction indices, but also by admonitions such as 'a complaint is a sales opportunity'. Indeed, in one of the branches studied there was a notice taped to the underside of the Enquiry Clerk's desk that pithily advised about opportunities for selling:

Change of Job? What happens to your pension?
Change of name? Are you getting married? How about a mortgage?

This stress on the customer and customer service is noted by Burton [1994] when she writes of the concern of financial service institutions to retain and attract customers;

"There has evidently been a shift from organisational cultures which were conservative, reactive and cautious, and where the main element of the job was administration. Contemporary financial service personnel are required to be proactive, entrepreneurial and possess a high level of interpersonal skills and marketing expertise." [Burton 1994, p. 5]

Within the Securities Centre of the bank this emphasis on the customer and customer satisfaction was manifested in an approach to a legacy problem that resulted in the phenomenon of 'lying to the machine'. The expert program used in the Centre was based around a workflow model of the Securities process. It required the completion of various 'formalities' before allowing workers to move on to the next stage in the program. Workers were required to indicate that they had completed all the formalities on each screen before they

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would be permitted (by the machine) to proceed to the next. This rigid workflow model would, however, occasionally create problems. It happened that there were a number of reasons - such as the need to complete the securities process rapidly, or when information arrived in an unexpected order - why workers might need to move on to later formalities before completing the earlier ones. In other words there were occasions when they needed to subvert the strict workflow model. In these circumstances it was a common practice for workers to 'lie to the machine', to adopt what Bittner [1965] calls 'gambits of compliance' to enable the work to progress and to benefit the customer.

Legacy issues can also arise from organisational or procedural changes instigated by legal reform or precedent - changes which the originators of the software package were clearly in no position to anticipate. This phenomenon is illustrated by the concern surrounding 'independent legal advice' (ILA) as a consequence of a recent court judgement - the O'Brien case. This case led to ensuring - 'checking' - that all the signatories to a security offered for a loan, such as a house, and all those who might have an 'interest' in such security - a tenant or children over 18 - had received 'independent legal advice' - independent, that is, from the 'main' signatory. They had to state formally, and in very specific language, that they refused the offer of ILA, that they were under no undue pressure, in a balanced state of mind, and the like. The minutiae of this process was quite extensive, including, for example, checking that signatories had signed for themselves, that the names corresponded to the signatures, that the wording of any refusal was sufficient, and more. The consequence of this legal judgement in terms of the utilisation of the software package was that it resulted in the abandonment of certain aspects of the system and the reintroduction of laborious manual processes into the work. This consequence is illustrated in the extract below which suggests that, despite the apparently 'computer driven' nature of the work in the Securities Centre, successful job completion is heavily dependent on activities and knowledge independent of the software package. This example confirms the inadequacy of simplistic,

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unidimensional and context free accounts of 'skill' which unproblematically associate deskilling, degradation and routinisation of work with increases in technology.

Next.
1. Sending out letters - getting details of solicitors to sign 'forms of consent'...."Solicitors very rarely do what you tell them...they never read letters...they do what they want."....
Having problems with a 'Form of Consent' - has come back not dated - and not witnessed by a solicitor (but by a Legal Officer)
2. Sending copy of 'form of consent' to Litigation to see if they can 'rely' on it or have to put nil value on the Security
......Looking at progress sheet...''Planning Report & Report on Title'...not able to get deeds from solicitors..."We may be able to get away with it.."....
3. Goes to talk to Assistant Manager .....
4. Writes note on folder - that they can't do 'Report on Title' without deeds..

VI. CONCLUSION: LEGACY, PROCESS AND WORK.

Which aspects of legacy system use must be retained, as they are, in new processes with new systems?

Which aspects of legacy system use must be retained but which may change in new processes?

Which aspects of legacy system use are an accidental consequence of the process used and may be discarded in any redesigned process?

Which aspects of the process are a consequence of limitations of the legacy system and should be supported in a different way?

The questions above present a structured and reasonably commonplace approach to the issue of legacy. Whilst these can be regarded in many ways as quite reasonable questions this software engineer's 'wish-list', in its wholehearted commitment to a process model of organisational life, tends to ignore the complexities of organisational work, in particular its contingent and situated nature [Suchman 1987]. Indeed, there were detailed and work-intensive efforts made by members of the bank itself to arrive at adequate models of the processes they engaged in. This activity was particularly visible in one of the bank's new Lending Centres where the lending function for the whole of the North West of England was intended to be centralised. Part of the 'centralising' objective was an attempt to ensure that, for every single process in which the

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bank engaged, there would be a process map so that anyone could come in and do the job in exactly the same way as anyone else. The perception was that there was a definitive way to engage in a particular activity and managers tried to ensure that, for each activity their staff engaged in, there was a process map representing 'best practice'. To do this, however, it was necessary for workers involved in different aspects of the lending process to arrive at some sort of understanding of the work of others involved in the same process, beyond their own teams, and sometimes beyond the walls of the Lending Centre itself. For each process map produced it was necessary to consider a whole slice of organisational life. However, achieving such an understanding was problematic. The individuals concerned were obliged to visit other individuals in other parts of the Lending Centre and engage in sometimes intense negotiation in order to come up with something that adequately took everybody's own relevances into account. Furthermore, it became quickly apparent that any formulation of 'best practice' relies on *ad hoc* considerations of situated practices of work that nowhere figure in the process maps themselves [Anderson et al 1989].

An illuminating example of this complexity is provided by the case of the manager of the Lending Centre's 'sanctioning' department, who was overviewing the production of a process map by two of his staff. The process in question was a complex one regarding how to eliminate or reduce the level of 'hard-core' debt run up by customers using a certain kind of credit card, while simultaneously turning that occasion into an opportunity for what was, effectively, a 'sale', by offering the customers loans to clear the debt. To achieve this 'goal', it was clear that staff from the sanctioning department would have to collaborate with staff from other departments ('phones' and 'monitoring and control'). The manager in question was therefore obliged to visit the managers of the related departments to discuss the best way to lay-out the process map. Each manager wanted to arrive at a model that would best reflect the day-to-day activities that their own particular staff engaged in. The two managers had to work together to produce some kind of model that seemed to give due consideration to their own, highly

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particular requirements. The end product was a complex and highly creative design that was heavily informed by their own experience of the day-to-day character of their work, and the work of the staff around them. None of this discussion should suggest that the process model they finally arrived at was necessarily a 'poor' or 'inadequate' representation. However, what we would point to is the way numerous contingent considerations had to be brought to bear to arrive at that 'right' model, with neither of the managers offering an unproblematically 'clear' and 'definitive' version. We can see, then, that even process models themselves are a collaborative production of situated interaction, relying on all of the *here* and *now* preoccupations that the parties to it bring to bear. To extend Suchman's [1987] observations regarding the situated and contingent realisation of 'the sense within the plan', we might further observe that the very making of the plan, or in this instance the process model and its constituent maps, is also a contingent affair relying on situated practices of work.

This brief example serves to underscore the point we are making in this paper, namely that legacy concerns are not merely technological in focus but also organizational in the sense of being intimately wrapped up with the everyday accomplishment of work[5]. Consequently, straightforward process approaches, despite their attraction to system modelers, are unlikely to take into account the various interactional subtleties involved in the actual doing of the work. In that case understanding how 'processes' may be made efficient and effective would seem to require a nuanced view of various factors, including working practice, communication and control problems, and indeed any number of complex articulations of structure, process, technology, and 'situated' knowledge. The

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[5] An interest in technological legacy also highlights issues of skill and skilful working within highly distributed commercial organisations. These skills include a range of procedures that comprise 'the work to make the technology work', as well as skills of 'awareness' and 'emotion work'. Awareness refers to the subtle but essential competencies involved in making sense of, and thereby being able to make it available to others, what is 'going on'. These competencies are required for 'mutual intelligibility' on the part of the members of a work team.

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fieldwork observations further suggest that in a number of instances the deployment of local knowledge and instigation of informal teamworking, such as asking for codes to enter screens, how to complete routines; etc, was effectively constituted as 'ways to cope' with the inadequacies of the computer systems; that is, and to adapt a phrase of Garfinkel's [1967], there are 'bad organisational reasons for good organisational practices". Any attempt to resolve legacy issues will depend for its success not only on finding the right answers but also upon deciding the right questions to be asked in the first place. We suggest instead, then, that the descriptive and analytic techniques to be found in ethnographic studies provide some particularly effective alternative ways of asking 'the right questions', or, to be more exact, of 'respecifying the problem' [Randall et al, 1992].

Our own ethnographic work within the bank over the past four years highlighted a number of other categories

- distributed co-ordination,
- plans and procedures, and
- awareness of work.

that may provide a better purchase for the analysis of work and the identification, description and resolution of legacy issues [see Hughes et al. 1997]. Distributed co-ordination refers to the fact that work tasks performed in complex settings are performed:

- as part of patterns of activity,
- as operations within the context of a division of labour,
- as 'steps' in protracted operations, and
- as contributions to continuing 'processes' of activity.

It is in this context that the 'legacy' issues surrounding the notion of Independent Legal Advice that stemmed from the O'Brien case, and also the concerns relating to templating in the relational database (ISS) and other applications, might most fruitfully be considered. Plans and procedures refers to the means by which distributed co-ordination is supported organisationally. Project plans, sets of

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instructions, activity manuals and schedules and workflow diagrams are all ways of facilitating the orderly production and accomplishment of work. The phenomena characterised as 'lying to the machine' might usefully be considered within this framework since a consideration of plans within co-operative work should be sensitive to different notions of 'following a plan'. Finally, 'awareness of work' refers to the way in which the organisation of work activities involves making the nature of those activities 'visible' or 'intelligible' to others doing the work. This was illustrated in this paper through the activities of the Mortgage Advisor and her response to the inadequacies of the existing system for generating sales.

Although the organisation we have referred to is a financial one, we suspect that the issues we have identified will be prevalent across many other types of organisation, albeit with their own particular accent. The general point to stress is that organisational change, whilst constituting an attempt to move away from past practices and activities, will necessarily have to deal with the past in some way. Although this statement may sound tautological in that the move to some future state - the point of change, after all - will definitionally involve dealing with the past (if only to remove it), the emphasis needs to be placed upon the practicalities involved in organisational change. These practicalities include, amongst other things: dealing with past experiences; 'knowledge and skill' coping with those things that cannot be changed (or at least not immediately); dealing with priorities determined elsewhere, such as investment in IT; dealing with obligations, legal and otherwise, which cannot be changed; and many, many more. In other words, it is dealing with legacies as the practical issues of everyday work.

It would be easy to read some of the vignettes provided in this paper as illustrations not so much of some of the generic legacy issues which face all organisations bent on change, but as a record of incompetence. The Bank is not, admittedly, a perfect organisation, but then no organisation is perfect, even if we admit of degrees in such estimations. Planning and directing organisational

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change on a large scale is not an easy business and one of the major difficulties is resolving the interdependencies of change. Change involves such things as matching technological changes to changes in work practices, finding out what training is required to change the working culture in needed ways, and maintaining those continuities of the organisation, such as its customer records, which must be transported into the new arrangements. These factors are, of course, only some of the legacies which have to be dealt with alongside of all the other contingencies that will arise as part of members of an organisation's daily life. It is a major tenet of CSCW that distributed system design needs to attend to the sociality of work. Part of sociality is understanding how technologies become embedded and are understood within day-to-day working practices. In keeping with the spirit of this injunction, recognising that technology is not the only legacy issue is an important step. It means that it is no longer enough merely to examine the status quo and project a new set of arrangements, as some more simplistic approaches to process modelling might imply. What must also be taken into account are the current legacies - cultural, organisational, and members' very understandings of how being a member of the organisation is achieved - as well as technological, given that everything cannot be changed at once.

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