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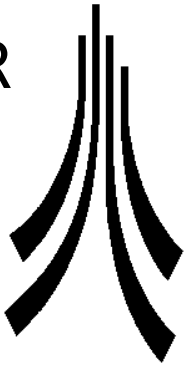

Banking on the Old Technology: understanding the organizational context of 'legacy' issues.

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ABSTRACT

One preoccupation of academic and non-academic interest in contemporary organisations is the attempt to situate and understand organisational change as responses to what are seen as major transformations in the social and economic environment in which organisations operate. Although there are various diagnoses of these changes, (Lash and Urry, 1987; Hammer and Champy, 1993), Information Technology is seen as a key element in these changes, especially I.T systems that can facilitate coordination and communication of decision making, and support skill and knowledge. (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).

Despite this emphasis on IT, both the Labour Process approach and its critics have tended to treat IT relatively unproblematically, (in contrast to ongoing debates on 'resistance',' skill' and so on) with the simple view that IT contributes to productivity, deskilling and monitoring as a product of management attempts to control the labour process. In addition analyses of IT and the labour process have generally been strongly theoretical leading to what Button (1993) calls "the case of the disappearing technology" - that is, even empirical studies of new technology (Knights & Willmott 1988) have failed to address the details of technology in use but instead have focused on the role of the technology in producing particular managerial or workplace configurations which are themselves derived from theoretical treatments of organisational life.

This paper presents some 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 so on in a rather different fashion, by focusing on the issue of 'legacy'. Computer systems have been installed for some time and no matter how well they may have fitted the situation initially, usage and the circumstances of use have changed; needs and users change, and, most importantly, the organisation itself may well have changed (Henderson & Kyng 1994). Although brought to the foreground of public attention by concerns surrounding the 'millenium bug', legacy issues have a far wider organisational purchase and relevance emphasising the idea of IT as constraining various kinds of organisational behaviour and activities, constraints that need to be skillfully negotiated by those at work. A number of examples of legacy issues and their impact on everyday working will be presented suggesting that 'legacy' is not merely a problem facing organisations with aging mainframes and dated software.

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Introduction: technology & organisational change
One longstanding preoccupation of academic and other interest in contemporary organisations is the attempt to situate and understand organisational change as responses to what are seen as major transformations in the social,economic and technological environment in which organisations operate[i]. Information Technology is frequently seen as a key element in these changes, especially I.T systems that can facilitate coordination and communication of decision making, and support skill and knowledge. (Zuboff, 1988) Collaborative work, a

[i] Although there are various diagnoses of these changes, (the Labour Process Debate is obviously one approach but see also, for example, Lash and Urry, 1987; 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.

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). Despite this emphasis on IT most attempts at understanding 'technology in use' have generally been strongly theoretical, leading in many instances to what Button (1993) calls "the case of the disappearing technology" - that is, even empirical studies of new technology (Knights & Willmott 1988) have failed to address the details of technology in use but instead have focused 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 some 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 so on in a rather different fashion to that conventionally followed, by focusing on the issue of 'legacy'. Computer systems have been installed for some time and no matter how well they may have fitted the situation initially, usage and the circumstances of use have changed; needs and users change, and, most importantly, the organisation itself may well have changed (Henderson & Kyng 1994). Although brought to the foreground of public attention by recent concerns surrounding the 'millenium bug',(and more recently the 'Euro') legacy issues have a far wider organisational purchase and relevance emphasising the idea of IT as constraining various kinds of organisational behaviour and activities, constraints that need to be skillfully negotiated by those at work. (In many ways despite the hype and publicity the 'millenium 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 suggesting that 'legacy' is not merely a problem facing organisations with aging 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 the suggestion in this paper is 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.

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 is the detailed observation of practices, conversations, and activities and an emphasis on furnishing a 'thick description' of the routine, everyday in the practical accomplishment of 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, unremarked, cooperative aspects of work, 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 but bring a particular focus to the analysis of systems in use and thereby outline the 'play of possibilities' (Anderson 1994) for work and design; *"to enable designers to question the taken-for-granted assumptions embedded in the conventional problem-solution design framework"* (Anderson 1994:170). 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 provides an alternative way of asking questions, or ways of 'respecifying the problem'. (Hughes et al, 1992).

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.." (Blackburn et al 1985)

"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

Castells (1996) in his vision of an 'Information Society' suggests that: *"The maturation of the information technology revolution in the 1990s has 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: 240).* However, as anyone who ever bought a 'Sinclair C5' might ruefully admit, technology has often been the subject of quite unreasonable 'hype' and information technology, as the quotes above indicate, has frequently been the subject of quite unrealistic expectations. This certainly seems to be the case in banking since financial institutions were among the first wave of business organisations to computerise many of their operations to the extent that many of their basic functioning is now dependent on those now ageing systems. While scenarios of 'off-planet' banking remain jounalistic fictions and videoconferencing, video booths, and Internet banking remain experimental, financial institutions have long been in the forefront of the use of distributed computer systems and recently have begun to explore the increased use of networked IT to support decision-making, quality control and customer services with various software packages and expert programs, provided for informational databases, risk grading, and decision making. The research reported in this paper draws on a case study of a major retail bank which, for the last few years, has been undergoing 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, coordination and the flow of work - the point of this section is then to pay some attention to the technology, to highlight how these systems are utilised as part of everyday, routine work. the emphasis in this section is also on 'new' technologies - on new 'expert' programs recently introduced into the bank. "Legacy' as an issue is quite easily identified with ageing and creaking mainframes; however, we suggest, 'legacy' concerns quickly arise out of the organisational context of use even with the newest software packages.

A number of new 'expert' software programs had been placed in the specialised centres. The GAPP (grading and pricing policy) machine, for example, was a recent addition to the Business Centre - the software on the machine had come from Region and was used to calculate Risk Grade of Businesses, influencing lending decisions and the pricing policy that should be adopted on the 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 the Manager's visit to the company;

Next.
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 acc obtained etc
3. Screen - "Business Definition' - "What does pharmacist go under?" - discussion with other BMAss - "try that one" - clicks on various titles - "whats other?" - other small screens appear. - eventually finds it.
4. Screen 'Audited Management Accounts' - "do you put a minus in here if its 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)
Again - as with other software packages - the material to be entered - manually - into the program already existed elsewhere in the system - yet the inability of packages to 'talk' to each other resulted in wasteful duplication of effort - eg the 'Decipher' package.

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.[ii] thereby contributing to an organizational legacy of both of 'checking' and of multiple data entry into

[ii] There were some additional features of the program which, because of its recent introduction and apparent novelty, appeared to be unused.

systems 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 and meant that GAPPing seemed less important as a decision-making device than as a 'security blanket' for decisions already made; and the starting point for negotiation with the business concerned. As an Assistant Manager said; *"you cannot say straightaway...just because the computer program says 1% higher...you cant 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 and which was dependent on the Manager's store of local and anecdotal knowledge; eg "are there any signs of creative accountancy?"; "are there any anecdotal signs of problems?".[iii] It may also represent 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, as Feldman and March (1981) suggest, be a reflection of the fact that much of the information used in the Bank had been gathered primarily for 'control' rather than decisionmaking - that is, it is gathered in a 'surveillance' rather than a 'decisionmaking' mode[iv].

Another 'expert' program was 'TecSec' a system introduced into the bank's Securities Centre for the taking and maintaining of securities. For workers in the Securities Centre 'doing the work' involved a complex series of interactions between the workers in the Securities Centre, the Branches, the software and the paperware. Examples from the fieldnotes illustrate the variety of processes that 'typically' constitute the 'work' of a Doer1. They also serve to illustrate the intensity of work, 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 - if they need any other info - it will go into a second screen.
5. Security has to be revalued every 4 years- "its automatically picked up from the date I put in - we request a valuation from the Branch - letter with facesheet and questions they fill in.."
6. Printing letter which tells the Branch which % of the valuation they can take.
7. Prompt at bottom of screen - saying its complete - so double-checks it.
8. Goes back into 'Enquiries & Prints'
9. Selects 'Blank Forms & Letters'
10. Chooses letter to send off.
11. Back to main screen - 'Current Formalities' - more questions.."once you reach a certain point..it will go to the Assistant Manager to check..appears in checking file"
12. Checking that paper matches the screen.

[iii] Such 'anecdotal' evidence should not, however, be sneered since in at least one instance - a double glazing firm - no indication of trouble was revealed by any of the computer packages or printouts and 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...

[iv] Feldman and March suggest that, "When strategic misrepresentation is common, the value of information to a decision maker is compromised....Individuals develop rules for dealing with information under conditions of conflict. Decision makers discount much of the information that is generated." (Feldman & March 1981: 177) 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; and similar scepticism about 'business forecasts' (especially when produced by the business itself and so on. It was not, however, the situation that Feldman & March (1981) describe, where, "Decision makers learn not to trust overly clever people, and smart people learn not to be overly clever" (Feldman & March 1981: 177) Above all, the main point to make about the decisionmaking process and the usage of information (whether on paper or computer) is concerned with appreciating the careful 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' but that interpretation of the information, and decisionmaking from the information is dependent on certain, 'nuanced' expectations. *.."decision making process, what's the companies trading performance been like? quite good, ..whats its proven track record from audited figures? thats quite good, surplus resources in the company, retained profits in the company. .. thats quite good. What about the product that they're dealing with? do we consider thats the sort of thing that is. that can be moved on and sold....*(discusion of business) *...it shifts .. So, the product, the siting, the company, proven record, management; what do we think of the management? pretty good, pretty switched on, .. everything about it looks OK,*

13. Goes off & gets form. Formality has prompted him to go to Land Registry - to ensure no adverse entries on Land & from entries already keyed in it 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 - uses stamp for address of NWB.
15. Goes back to screen - been given ref. no. - sends off to Plymouth to see if any adverse entries on the Land..."because we cant answer a question it puts it in the diary.." (can complete it only when form returned from Plymouth.
16. Going through screen questions on Fire Policy - when answers questions screen comes up "releasing formalities"
17. Interr - phone - writes details on pad; discusses on phone; goes off to consult colleague..
18. Back to screen - working through questions - "releasing formalities"
19. Going through 'work measurement' tally....
20. On screen - "You have reached a checking stage: Now pass file to checker...Remember! Do you need to tally Work Measurement?"
21. Gets charge form and hands everything to Assistant Manager.

'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: 790)
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 although, like other equivalent financial institutions, the available hardware appeared extensive and the software sophisticated, observation and conversations with users indicated a number of problems in that the system as a whole, and both main software packages, was seen as 'dated', 'slow', prone to unpredictable breakdown and not 'user friendly'[v].. 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, sometimes for considerable periods of time and occasioning 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 have resulted in 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 computer was unable to 'log on', being forced either to log on at a different machine and then transferring or having everyone stop work (and on at least one occasion put their hands in the air to 'prove' they were not working) whilst they 'logged on'. 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..out of order accounts (WE008)
2. Screen still down..."Someone dropped something on the cable"
3. 20 mins later..screen still down.
4. Screen back.
5. Machine goes down again..."Have you got a Wycombe password?" "You know I haven't because I violated myself.."
6. Calls to another team - "Have you got a Wycombe password?'
7. Goes to another team's desk - logs into her screen (gone for lunch)
...Interr...9. Assistant asks to leave machine on so they can use it.
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 remained, 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, perhaps best illustrated by the 'problem of the phantom branch' related by one manager in a comment that resonates with the concerns of Pressman:
" 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

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

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. This is detailed in the following extract from the fieldnotes where a Manager provides a familiar explanation for the failings of the direct debit system on the newly installed retail banking platform. In so doing he also indicates some of the organisational concerns, the skills and training issues that arise as a consequence of technological legacy[vi].

Reg Payts screen - comparing screen to confirmation of customer's instructions -
Reg Payts DD Type 1 screen - 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 ((goes to Reg Payts screen and points to entry)) refers to GE Capital Bank - amount to the same thing - SCM was looking for originator/payee - looked at reference number and then he found it.
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
.....
Next spot check form - customer instruction to the left - pointing to customer number - enters to Reg Payts screen - compares number to form - enters different number - Reg Payts (Act Rec Sum) up - next - pointing to customer instruction - studies screen - focuses on Co-Op Bank Card Number on customer form - compares to screen -...

The originator's name just comes up as 'Visa' - Co-Op Bank's Visa Department - however 'Visa' is under umbrella of various banks - initials spot check form - calls over Assistant Manager (Technical Services) - Assist Manager is currently stood at desk opposite - Assist Manager comes over ....
SCM details problem and AM(TS) recognises -

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 yeah (.) and there's another one there for Dixons
...
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 (.) ((shows me next screen)) there's no mention of Co-Op bank (.) so they'll go on to the next screen (.) ((shows me 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 ((does so)) 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 (.) now if it isn't resolved then as [AM(TS)] says the TLO will

[vi] An example from the field notes demonstrates that staff are not always familiar with the available software, even when dealing with apparently 'routine' enquiries; in this case transferring an account from one branch to another.

"1. Transferring an account...looking at follow up screen..Transfer Associate Products..
2. Looks at PIF for Enquiry code...
3. Enters Customer Product History Screen...
4. Looks at PIF again..
5. Writes details on form..
6. Uses print screen facility ...goes to printer..
7. Types into Update Account Transfer screen..error ..quits it..
8. Types into Transfer Accounts Between Branches screen..gets same error message as before.."get lost"..
9. Looks at PIF again..
10. Types into Update Associate Product screen...Transfer Customer..
11. Crosses fingers.
12. "It works"

then make a Service Recovery Sheet (.) so the information I was speaking to you about this morning (referring to printout of Service Failures) Is it a complaint? Is it a query? Or what is it? (.) 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 ISS the relational database. It is also informative of 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[vii].. 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 actively search the relational database to 'spot' potential customers (a service which was provided by Regional Office) but instead was forced to develop and rely on a range of haphazard and time consuming search techniques.

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 al ook daily"
9. Eventually targeting involves the study of printouts on;
- *personal loans*
- *change of address*
- *credit/overdraft limit*
- *new applications*
- *1st time buyers printout*

all include details of accommodation; but the scan involves spotting names and then calling up their account on VDT and deciding whether circumstances merit an approach.
10. Has discussion with another colleague about search;
"1st time buyer printout is due down but they wont say what date"..."It may be due down next week and you've wasted all your time"
11. Adviser is unable to conduct any search of the database - enquiry codes are only used for details of the customer not for interrogating the database
12. Begins search of printout for leads; takes printout to Assistant Manager to discuss how to search it - long discussion ensues.
13. Decides to persevere with search of printout and then go on to do 'best practice' - the way to spot a lead - do a small presentation appropriate to jobs - to provide her with leads.

[vii] A similar problem arose with 'TecSec', the new system used in the Securities Centre which effectively 'drove' the work of the unit through the completion and release of work formalities. Yet even this new system seemed markedly inflexible - for example letter templates were very difficult to change, and had not been altered to accommodate changes in legal precedent, for example, over independent legal advice and, as a consequence, this process was complicated by manual procedures.

14. Continues manual search of printout - asks colleague what a certain number means. Attempting to compile 2 lists - one for homeowners; one for first time buyers - incentive in March is not just about 1st time buyers.
15. Asks record clerk about new account application forms - asked to keep them for use for 'spots' --response "I used to keep them but nobody ever asked about them"
16.Continues to search printout - using database to check details - to see if they constitute 'leads' -
17. Discusses search with Financial Adviser; "I'm just looking at personal loans and whether they're in rented or parents accommodation...its worth a go is'nt it?"

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, but the point about some of the fieldwork examples above is that a legacy issue has 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 experience in using it. However, of the 500 suggested modifications to the 'TecSec' software that had 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, reflecting the complexity of any change or where a change, though relatively straightforward, would have to be made in many areas of the system to be effective; *"..the difficulty is basically..talking and getting changes ratified by programmers ..its not just sophistication but also implications .... apparently small changes may have major implications"*. [viii] This is not necessarily an indication of the unwillingness of those responsible for the development of the system to make appropriate changes, it is as much 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 in that they direct attention to the need to reorganise work and the implementation of new technologies in a more integrated way. How to achieve this 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' first time, but what this suggests is the need for more effective monitoring of new technologies in their situations of use and, as part of this, effective mechanisms of involving users' experiences in development.

However, there are some more general issues here, and difficult ones at that, related to the implementation of technological change. No matter how promising new technologies may seem, the realities of their implementation are typically disruptive and involve huge overheads of retraining, compensatory payments, and the lead-times required for familiarisation of workers using the system, among many other problems which constitute a familiar refrain whenever new systems are introduced, and no matter how careful the planning has been. There is no doubt that such changes are difficult and complex in whatever industry or enterprise implementing them. But, from the point of view 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.

Legacy & organisational change - consumer culture & '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 which was reinforced both 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 which 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;

[viii] 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.

"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 1994:5)

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 bizarre phenomenon of 'lying to the machine'. The expert program used in the Centre was based around a workflow model of the Securities process and required the completion of the various 'formalities' before allowing workers to move on to the next stage in the program and workers were required to indicate that they had completed all the formalities on each screen before they would be permitted (by the machine) to proceed to the next screen. This rigid workflow model would, however, ocassionally create problems when, for a number of reasons, such as the need to complete the securities process rapidly or when information arrived in an unexpected order, workers would need to move on to later formalities before completing the earlier ones, that is, they would need to subvert the strict workflow model. In these circumstances it was a common practice for workers to 'lie to the machine' 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 is illustrated by the concern surrounding 'independent legal advice' as a consequence of a recent court judgements - the O'Brien case- which subsequently involved 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 - have received 'independent legal advice', that is, independent from the 'main' signatory, or must formally, and in very specific language, state that they refuse 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, 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, as illustrated in the extract below;. an extract that 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, confirming the inadequacy of simplistic, unidimensional and context free accounts of 'skill' which unproblematically associate deskilling, degradation and routinisation of work with increases in technology.

4. Chasing ILA (Independent Legal Advice) - looking at Securities Requisition. Has sent letter on 'debtors confirmation of facts' - has not been returned. Can photocopy letter and get another chase letter from the printer. - "We usually chase them 2-3 times and then we get the Branch (if we get no response) to chase them for us."...
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 put nil value on the Security. (Putting 'nil' value on a Security (if forms have not been signed properly etc.) - influences the accounts held by the branches - and also seems to be something of a 'slap on the wrist' for failing to ensure that forms have been completed properly....)
.....looking at progress sheet...'Doer2' job...'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..
5. "I think we'll get a waiver on this" (With formalities you can 'tick' or initial them...if you put a red cross it means it will be waived (waived by Securities Centre Manager)...has to go to manager to sign.) Puts in folder - 'items for manager's signature'.

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). What we have attempted to suggest in this paper is that legacy concerns are not merely technological in focus but also organizational in the sense of being intimately wrapped up in the everyday accomplishment of work[ix]. Consequently, straightforward process approaches, despite their attraction to system modellers, are unlikely to the various interactional subtleties involved in work and understanding how 'processes' may be made efficient and effective 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[x]. Any attempt to resolve legacy issues will depend for its success not only on finding the right answers but upon deciding the right questions to be asked in the first place. We suggest instead that the descriptive and analytic techniques to be found in ethnographic studies provide alternative ways of asking questions, or ways of 'respecifying the problem'. (Hughes et al, 1992).

Our own ethnographic work within the bank over the past four years has highlighted a number of other categories - 'distributed coordination'; '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 coordination 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, as contributions of continuing 'processes' of activity and it is in this context that the 'legacy' issues surrounding the notion of Independent Legal Advice that stemmed from the O'Brien case as well as the concerns relating to templating in ISS and other applications might most fruitfully be considered. Plans and procedures refers to the means by which distributed coordination is organisationally supported. Project plans, sets of instructions, activity manuals and schedules 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 cooperative 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; illustrated in this paper through the activities of the Mortgage Advisor and her response to the inadequcies of the existing system for generating sales.

In this paper what we have been trying to do is to bring out some of the aspects of legacy by drawing on fieldwork studies of the concurrent changes in a large retail bank in the UK. Although the organisation is a financial one we suspect that the issues we have identified will be prevalent across many other types of organisation, albeit each having their own particular accent. The general point we have been making is that organisational change while an attempt to move away from past practises and activities will have to deal with the past in some way. Although this may sound tautological in that the move to some future state - the point of change, after all - will definitionally involve dealing with the part if only to remove it, the emphasis we want stress are the practicalities involved in organisational change; practicalities which include, among others, dealing with past experiences, knowledge and skill, coping with those things that cannot be changed (or at least not immediately), having to

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[ix] 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 could be described as competencies required for 'mutual intelligibility' on the part of the members of a work team.

[x] The 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".

deal with priorities determined elsewhere, such as investment in IT, having to deal with with obligations, legal and otherwise, which cannot be changed, and more. In other words, it is dealing with the 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 organisation change on a large scale is not an easy business and one of the difficulties, though a major one, is resolving the interdependencies of change, 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, maintaining those continuities of the organisation, such as its customer records, which must be transported into the new arrangements. These are, of course, only some of the legacies which have to be dealt with along with all the contingencies that will arise as part of the 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 this 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. What must also be taken into account are the current legacies, cultural, organisational, understandings as well as technological, given that everything cannot be changed at once.

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Bibliography

Anderson, R. J., (1994), 'Representations and Requirements: The Value of Ethnography in System Design.' Human-Computer Interaction, Vol. 9 pp. 151-182.

Anderson, R. J., Hughes, J.A., and Sharrock, W. W. (1989) Working for profit, ; The Social Organisation of Calculation in an Entrepreneurial Firm. Aldershot, Avebury.

Atkinson, J. (1986), Changing Work Patterns: How Companies Achieve Flexibility to Meet New Needs, London: National Economic Development Office.

Bagguley, P., Mark-Lawson, J., Shapiro, D., Urry, J., Walby, S., and Warde, A. (1990), Restructuring: Place, Class and Gender, London: Sage.

Bittner, E. (1965), 'The concept of organisation', Social Research, 23, pp. 239-255.

Bowers, J. (1994), Understanding Organisation Performatively', COMIC Working Paper, MAN-1-4, Department of Computing, Lancaster University

Burton, D. (1994) Financial Services and the Consumer, Routledge, London

Button, G. and King, V., (1992) Hanging around is not the point, workshop paper, CSCW '92, Toronto.

Casey, C. (1995) Work, Self and Society After Industrialism. London. Routledge.

Ducatel, K 'Computer Networks in Britain: communication technologies or technologies of control?' in Robins, K (ed) Understanding Information: Business, Technology and Geography (London: Belhaven Press, 1992)

Garfinkel, Harold, (1967), Studies in Ethnomethodology, Polity Press, Cambridge

Gergen, J 'Organiation theory in the Postmodern Era' in Reed M and M Hughes (eds), Rethinking Organisation (London:Sage, 1992)

Grudin, J - 'The Computer Reaches Out: The Historical Continuity of Interface design', in Proceedings of ACM CHI '90 Conference of Human Factors in Computing Systems (New York: ACM Press, 1990)

Hammer, M., and Champy, J. (1993) Re-engineering the Corporation: A Manifesto for Business Revolution. Nicholas Brierley Publishing.

Hughes, J. A., King, V., Rodden, T., and Andersen, H. (1994) "Moving out from the control room: Ethnography in system design". In Proceedings of CSCW '94, Chapel Hill, North Carolina.

King, Val, and Randall, Dave, (1994), Trying to keep the customer satisfied, Proceedings of the 5th IFIP Conference on Women, Work, and Computerisation, July 2-5th, Manchester, England.

Kunda, G. (1992) Engineering Culture: Control and Commitment in a High-Tech Corporation. Philadelphia. Temple University Press.

Knights, D, Willmott, H and Collinson, D. (1985) Job Redesign: critical perspectives on the Labour Process. Aldershot. Gower

Lash, S. and Urry, J. (1987) The End of Organised Capitalism. Madison, Wisconsin. University of Wisconsin Press.

Nonaka, I. and Takeuchi, H. (1995) The knowledge-creating company : how Japanese companies create the dynamics of innovation. New York : Oxford U.P.

Pycock, J., Calvey, D., Sharrock, W., King, V., and Hughes, J., "Present in the plan: Process models and ethnography, Comic Document MAN-1-7

Randall, D. and Hughes, J. A. (1994) "Sociology, CSCW and Working with Customers", in Thomas, P (ed) Social and Interaction Dimensions of System Design. Cambridge University Press Cambridge.

Randall, D., Hughes, J. A., and Shapiro, D. (1992) "Using Ethnography to Inform Systems Design". Journal of Intelligent Systems, Vol. 4, Nos 1-2.

Reed, M (1992)The Sociology of Organisations; Themes, Perspectives and Prospects Hemel Hempstead: Harvester Wheatsheaf,

Rheingold, H Virtual Reality, (1992) London: Mandarin.

Scott Morton, M. ed. (1991), The Corporation of the 1990s: Information Technology and Organizational Transformation, New York: Oxford University Press.

Suchman, L., (1987) Plans and Situated Action: The Problem of Human-Machine Communication. Cambridge University Press. Cambridge.

Thompson, P and Warhurst, C. (eds) (1998) Workplaces of the Future. Basingstoke. MacMillan.

Webster, F. (1995) Theories of the Information Society. London. Routledge.

Zuboff, S. (1988) In the age of the smart machine. Oxford: Heinemann.