Ethnography in parallel

Rinku Gajera
Xerox Research Centre India
Rinku.Gajera@xerox.com

Jacki O'Neill
Microsoft Research India
Jaoneil@microsoft.com

Abstract. Ethnography has been introduced into technology design lifecycles to help sensitise new technologies to the work practices of their intended users. This paper reports on how ethnography was used in parallel to technology prototyping in the design of a workflow system to improve accuracy and efficiency in banking in India. Unlike previously largely positive reports of how ethnography helps to shape design, the case study presented here highlights the difficulty of conducting ethnography in parallel to prototype development. The tight contingencies of the prototyping cycle meant that only some of the ethnographic findings were incorporated into the design – those that fitted easily with the envisaged prototype. However, the findings from the ethnography suggested more fundamental changes were required. In this case, there was no way to incorporate such changes. We discuss the impact of this on the solution and lessons drawn for future interventions.

Keywords. Ethnography, concurrent ethnography, design, prototyping, banking, workflow technology, ethnomethodology, India

Setting the scene

There has been much discussion of the role of ethnography in design in CSCW and HCI [8,10,21] since it first began to be used in the late eighties and early nineties to help designers to produce systems which take into account users actual work practices. However, the most comprehensive discussions of how and when ethnography can be incorporated into industrial design lifecycles remains that from the Lancaster school in the 1990s [17,25,22,16,15]. Suggested processes for ethnography and systems design from the Lancaster school include quick and dirty ethnography [16,17], concurrent ethnography [16,17,25], evaluative or sensitising ethnography [16,17], the use of design probes [10] and perhaps the most ideal approach from the ethnographers perspective ethnography as the starting point for design [18]. We have had some success with this latter approach in industrial research, moving from an ethnographic understanding of a setting to technologies incorporated into products [see for e.g. 18,7]. However, whilst it might be our ideal, it is not always possible and sometimes designers come to us ethnographers with technology ideas into which they would like some-

how to infuse the users perspective. Since, like Hughes et al, we tend to believe that "…despite less than ideal circumstances […] one can always learn something from ethnography" [16, p.6] we are typically happy to oblige. In this paper, we report on an ethnographic study carried out in parallel to prototype development. This paper provides something of a cautionary tale however about how problems, both practical and conceptual, can prevent the full benefit of ethnography from being realized by taking such an approach. This is consequential for systems design, leading we will argue to a system which is likely to at worst fail or at best be worked around failing to bring its intended benefits [2]. We hope that this cautionary tale will help both systems designers and ethnographers from falling into the same trap. We briefly describe the technology project before reviewing the literature.

The technology prototype

The prototype, which we shall call BankFlow, aimed to reduce cost and improve efficiency in Indian banking. The Indian banking system faces particular challenges; growth in financial services is coupled with mandates to serve the rural unbanked, where footfall and income are lower yet branch costs remain fixed or more. Although banks are introducing Internet banking functionality, most processes will remain paper-based for considerable time. BankFlow was conceived of as a solution to help create branches with low capital and operational expense. It is a workflow solution which uses a Multi-Function (printing, scanning, email, etc.) Printer with document processing capabilities to redesign banking workflows. It includes workflows based around paper forms as well as electronic workflows. Promised benefits include removing costly and slow couriering of paper between branches and processing centres, reducing the amount of technology required to run a branch; enabling up front (partial) digitisation and improving efficiency and accuracy. It has been designed with the low bandwidth and intermittent connections of rural India in mind. It is near-term innovation to be quickly rolled out to address a current problem. BankFlow implements an account opening workflow, to demonstrate the capabilities of the technology.

Literature review

Despite the transformational promises of technology, the annals of history are littered with systems which are only partially used or worked around, not really causing much damage but neither delivering the promised improvements [14, 23, 20]. There are a variety of reasons why systems do not produce the expected effects. There is a tendency to oversimplify the work to be supported and the skills and knowledge of the workers [e.g. 23,2], whilst at the same time overestimating the capabilities of the technology.

Ethnography and technology design

Ethnographic studies, in particular ethnomethodological ethnographies [12], have been used in the technology design lifecycle to try and address some of these issues. This is because they reveal the situated accomplishment of action and are used to make the social organisation of action visible and available to design reasoning [3]. A key role of ethnography in systems design is to reveal the complexities and contingencies of the workplace of which designers should at the very least be aware. The idea is to enhance design by enabling designers and ethnographers to explore "the practical implications for design of the incarnate social organisation of human action and how it may be supported, automated, or enhanced by a system" [8].

Ethnography – even in the form taken by the modern workplace study - is a lengthy process compared to typical requirements engineering techniques and this can mean it is difficult to fit into the design lifecycle [16,17]. To address this various approaches have been suggested for incorporating ethnography into design:

- '*Quick and dirty' ethnography*, involving short focused studies (in a large domain) to get a general picture of the setting. The ethnographic findings feed into design through debrief meetings and a scoping document [16,17]. In the example they give this did produce some useful findings, however in practice it wasn't as easy to be influential in design with this approach and "development work on the tool continued almost independently of the fieldwork" [16].
- *Concurrent ethnography*, where systems design takes place at the same time as ethnography, with iterations of ethnography and prototype development [16,17]. Whilst in the ideal situation the initial ethnography precedes design, in practice, it is not clear how often this happens. Of the same project for example [25] describes the development of a generic highly configurable prototype going on at the same time as the initial ethnography. The findings of which are used to reconfigure future prototype iterations. The project they describe was successful, however it involved a small team with close communication doing research, so was not subject to the same constraints of an industrial development.
- *Evaluative ethnography* [16] involves an ethnographic study undertaken to provide a 'sanity check' [17] on an already formulated requirement proposal, with the findings being used to create a new more sensitized requirements specification. In their example, also successful, an ethnography of banking practice identified a fundamental mismatch between practice and the proposed technology, leading to the bank deciding not to buy. In this case certain crucial functionalities of the technology were fully worked out as this was a model the bank was buying in.
- What we call here *ethnography first* is the study of a domain of potential intervention with no preconceived design ideas, where design concepts come out of the observed setting itself [18]. When combined with an understand-

ing of new advancements in technology this has proved to be a fruitful method for innovation [18,7]. It is perhaps easiest carried out with a dedicated multi-disciplinary team set up to work in this way, but mainly it is a question of setting up the project in such a way that design does not start until analysis of ethnographic findings is completed.

- A final method comes from studying *technology probes* - where a lightweight technology is developed and put into the hands of users [e.g. 10].

In this project the technology idea had already been conceived and ethnography and systems design were undertaken in parallel.

Methods and field site

We conducted a multi-sited ethnomethodological ethnographic study of a variety of different branches and processing centres located in southern India for one bank. Observations and open-ended interviews were conducted in nine bank branches and three document processing facilities. There are two types of document processing facilities serving the bank: 1) Back Office Processing Centres (BOPC), which carry out verification and processing work on the various documents (currently paper-based) they receive from the branches. The bank operates a hub and spoke model where one BOPC serves multiple branches, and 2) Digitization Centres in other locations which digitise the incoming scanned forms. Out of nine branches, three each were located in urban, semi-urban and rural areas. The document processing facilities were located in the large cities, for ease of access and the digitization centres in semi-urban areas, for lower costs. Overall the ethnographer spent around 60 hours in the various branches, 23 hours in two BOPCs and 12 hours in one digitization centre in 2012. Since that the BankFlow prototype was to demonstrate an account opening workflow, the ethnographer followed the account opening process from start to finish to provide detailed insights with the aim of guiding prototype design. Account opening, a high-value process has considerable potential of improvement as it is somewhat error prone and involves costly and time consuming couriering of paper documents (which will increase as more rural branches open). Data was collected through detailed field notes, sketches and the collection of various artefacts and paper forms used in the account opening process. Interviews and workshops with the bank's management were undertaken. These investigated management's understanding of the pain points of account opening and their motivations for and satisfaction with the solutions they had thus far implemented. Their potential receptiveness to our technology prototype was also sought.

By understanding the detailed contingencies of the work and the orientations of the workers (and their customers), we hoped to be able to influence the design of the technology prototype. As mentioned in the introduction however, development of the technology prototype was going on in parallel to the ethnographic study. The schedule for the pilot imposed tight time constraints for the turnaround of the ethnographic

findings. Furthermore, this parallel development had an impact on which ethnographic findings would influence design and the extent to which they could do so.

That is, the technology prototype was conceived when designers had only a high-level view of the work and was therefore based on a number of assumptions. Since prototype development had already begun before the study revealed the actual practices of account opening, many of these assumptions were built into the prototype and were not open to change. The result was that the ethnographic study only had a limited impact on prototype development. We will address this issue in the discussion. First, however, we report on the findings of the ethnographic study and the details of the prototype.

Ethnographic study findings

In the account opening workflow, we primarily studied bankers, analysts and data processors to understand how they actually carried out the work of account opening, what it means to follow the process and where (and why) their practices varied from the stated process. In this paper we focus on the work of bankers and analysts.

Overview of the traditional account opening process

Account opening is a largely paper based process. We describe first the 'ideal' process, i.e. how it is *meant* to work, before describing the *actual* practices undertaken.

Two different processes are in operation: 1) The Traditional Process (See Figure 1) described in this section, used by 80% of the branches and 2) The Scanning Process recently introduced in 20% of branches where forms are scanned in the branch back office. This second process was introduced to improve efficiency and was still being rolled out. It is described in the section on Implemented Solutions.

To open an account, customers either come into a bank branch or are visited at home or work by a contract employee. In this paper we only discuss in-branch account opening. Customers and their banker fill out the necessary paper application forms, collect supporting documentation and provide an initial deposit. The banker verifies the provided information, using some software, signs and stamps the documents and creates a customer record on the bank's computerised file tracking system. An authoriser completes a second verification using the same software. Once the documents have been authorised, two copies of the authorisation are printed. One is given with the deposit to the bank teller. The second is attached to the application set (including application forms and up to 10 supporting documents such as ID, address proof etc.). These are couriered to the BOPC by end of each working day.

At the BOPC, the application sets are sorted by account type and passed to the PAN verification team. A PAN card is a photo ID card containing an individual's unique Permanent Account Number (similar to a US social security number). The PAN verification team checks that customer details on the application match those associated with the PAN using an online checking site. Each application set is then re-

viewed independently by two different analysts. Mistakes which are spotted at this stage are sent back to the bank branch. From here a reduced application set, containing just the double-sided application form and a copy of the ID and address proof, go to scanning. The sets are batch scanned and routed to the Digitisation Centre.

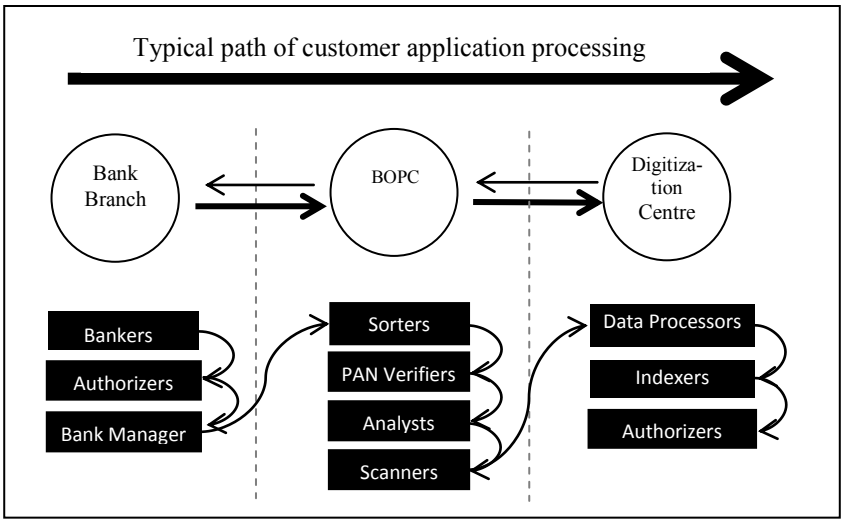

Figure 1: Traditional account opening process

Problems with, and solutions for, the Traditional Account Opening Process

The workshops with management highlighted some problems with the account opening process.

1. Couriering paper is expensive and slow.
2. Missing and inaccurate data is a major challenge. Incorrect forms are returned to the bank branch for correction. This to-and-froing of forms between branch and BOPC adds an undesired operational cost and further delays activation (up to 10-15 days), leading to reduced customer satisfaction. The management therefore had a strong interest in avoiding what is known as First Time Not Right (FTNR) and branches were judged on the basis of this.

To address these problems, the management implemented various solutions:

1) Paper checklist at BOPC 2) Verification Software 3) Branch level Scanning Process 4) Instant Accounts.

Paper checklist at BOPC. To improve the accuracy of the back office verification process two detailed 70-100 item paper checklists had been introduced to be used by Analysts. One generic and one specific to particular account types. For cost reasons, only a few personnel (who route and upload data) in the office have computers.

Verification software is a computerised version of the paper checklist introduced at branch level. The tool was envisioned as a proactive measure to reduce errors at the branch itself. Previously, verification was done by memory (relying on bankers' local

knowledge and experience) this tool introduced a more formal verification process. Ideally, Bankers should go through each application set using the software to check rules whilst the **customer is present with them** and collect more information if required. The software is often updated with new policies.

Branch level Scanning Process. This solution involves a rearrangement of the physical infrastructure, with BOPC processes being introduced into a subset of branches (20% at time of study). One or more analysts are based at branch level with computing and scanning resources to complete the back office processing steps in the branch. This solution has a different workflow to the Traditional Process described above: the aim is to introduce an instant workflow where each application is processed immediately. That is, once the bankers have processed and authorized *each* application, it is taken to the scanning room and signed off by the analysts. They prepare it for scanning, check the PAN number, then check the form using the Verification Software rather than paper checklists (as the analysts have the computing resources for the scanning process), then scan the form for data entry. The aim is to improve efficiency, by processing the applications more rapidly. This is an enabler for Instant Accounts.

Instant Accounts aim to enrol customers faster, by processing and activating customer accounts more rapidly (within three hours). This process is based around a pack, including a bank card and cheque book, given to the customer when they enrol. When the account is activated the customer is notified by SMS and can complete transactions. Although the account opening deposit is not processed so rapidly, so the customer cannot, for example, withdraw on the basis of it.

Workers orientations

Bankers in the branches, have a host of responsibilities besides assisting customers with their applications. However, their first priority is to assist as many in-coming customers as possible, taking the minimum time to do so during the customer opening hours. Administrative work is largely completed outside customer hours. Their primary orientation is to *customer throughput*. A second priority is to ensure that the data is correct and accurate. For this reason most work passes under multiple eyes, through different levels of verification with lots of signing, stamping and electronic authorisations. The concern here is to prevent fraud by customers and bank staff and the processes have been designed to maximise security and reduce risk. There is a tension between these checking and security focused features of the processes and the aim to provide efficient, friendly customer service. The orientations of the analysts in the BOPC are towards data accuracy, since their prime work is verification.

Actual work practices

The work practices observed differed in a number of ways from the ideal process, as workers attempted to get the work done in an efficient and effective way. The various solutions described above were often not used as intended.

During account opening, bankers are concerned with the twin priorities of customer throughput and data accuracy. Customers are often fitting in a visit to the bank at

lunch time, on a Saturday or after work. Many customers observed doing account opening were visibly impatient and bankers have developed a number of practices to maximize customer throughput, including collaborative form filling, postponing the use of the verification software and chunking work. A number of different paper forms must be filled in to open a bank account with many duplicating information. Officially the customer should complete the forms themselves, sign them and hand them to the bankers for checking. The bankers should then check the form using the verification software whilst the customer is present and collect any additional information. In reality the bankers filled in much of the information on the forms for the customer. Typically they would fill out the primary account opening application form *collaboratively with the customer* i.e. they would discuss the various fields with the customer, collect supporting documentation and so on. They would get the customer to sign any additional forms which the bankers themselves would fill in later after the customer has left, using information from the main application and supporting documents. They rarely used the verification software whilst the customer was present, however its use is required by process, so the forms are verified (almost mechanically) in batches at the end of the day with authorizations printed out. The bankers create the customer record on the file tracking system as and when they have time between customers. This work organization serves multiple purposes:

1) Customer throughput: it's both quicker for this customer and the following customers (reducing waiting)
2) It is more efficient as bankers can quickly identify which fields need to be filled and which not and it helps ensure the right information goes in the right field.
3) It helps ensure data accuracy as many customers are not well versed in English. In fact the bank provides local language versions of its forms as a reference only, which must still be completed in English but the instructions and field names in the native language is already helpful to customers. Variations in English spellings given supporting documents are common e.g. names but for the bank requires consistent spellings on all documentation.
4) It reduces the number of delays caused by illegible handwriting.
5) 'Filling-forms-for-my-customer' is considered good customer service.
6) Chunking similar work together, such as all verification work, is more efficient than undertaking the work as discreet tasks [22]. Whilst customer record creation is a quick task which can be fitted into free space throughout the day, verification is more time consuming and interruptions more costly, hence it is more productively done at the end of the day. Furthermore, verification requires bankers to re-enter some of the data on the verification software, taking more time.

After authorization, the application set and authorization document are sent for processing. What happens next depends on whether the branch has the Scanning Process or not. Where it doesn't, the forms are sent by courier to the BOPC. Whilst they take care of verification, the work is rather mechanical. Analysts spend around 10 minutes per application, going through the checklist. Where FTNR is detected the ap-

plication is put on hold and the form couriered back to the bank for correction. The two main components of FTNR are data completeness (that is all the necessary fields are filled) and correctness (that is all the data entered is correct). It is this costly FTNR process that management is trying to reduce. Completed applications are scanned in batches of 15-20.

Where scanning is done in branch, the branch level analysts do all three BOPC processes: PAN checking, verification and scanning. Typically each branch has 2-6 analysts depending on branch size. In the official process, new account applications are meant to come to the analysts one at a time throughout the day as they are completed in the branch. However as mentioned above, they actually arrive after verification has taken place outside of customer hours. During the rest of the day the analysts are processing other documents which are done one at a time.

After second level authorisation in the branch the applications are dropped off at the scanning space, where the analyst stamps the forms to say they've been received. The analyst then does all the preparatory work before logging onto the scanning system. Preparatory work includes manually checking that all the required information is there. The analysts do this because once they log onto the system they have two hours to complete everything, working in this way makes it easier to meet their targets. Bringing the scanning into the branch has had an interesting effect on FTNR. If the analyst spots an obvious mistake (e.g. salary not mentioned) before logging into the system she typically does not report it as FTNR, rather she returns the form to the branch to get it corrected. In the instances we saw this was considered as a favor to the branch staff (as it improves their FTNR rating) but it also works to the customers favor by reducing processing delays. However, the analysts complained that branch employees were becoming more relaxed about accuracy because errors weren't necessarily reported as FTNR. However, we have no evidence to say whether this is the case or not. Once all the preparatory work is completed, the analyst logs into the system and does the PAN checking, validation and scanning. Any mistakes spotted now are reported as FTNR. The scanning functionality on the scanning software remains the original batch scanning software, which further encourages scanning in batches, rather than the individual processing.

The only applications processed individually were those of selected customers, such as high net-worth customers. For the majority of the customers, Instant Accounts were not activated within three hours, since the application forms were not processed until the end of the day.

Summary: Impact of implemented solutions

Underlying three of the solutions implemented by management to improve accuracy and efficiency - the verification software, branch scanning process and instant accounts - is the idea that work should be processed one application at a time as it is created. This idea of a one job at a time workflow has parallels to the print shop workflow described in [2]. As in that case, because this projected workflow does not fit with actual practice, the implemented technologies are not used as intended and thus do not give the expected benefits. In this case, there are a number of features of the work organization which work against this. Firstly, given the concern for customer

throughput, extra time during the customer interaction is considered too great an overhead. Secondly, there is a strong preference for processing time consuming work in batches. Thirdly, the scanning technology is actually designed for batch scanning. Whilst taking a one at a time approach could potentially improve data accuracy, by identifying and resolving problems whilst the customer is present, it does not take account of the parallel need for customer throughput. Indeed whilst data accuracy is only a problem for less than15% of new account applications, undertaken the implemented measures to address this as designed would negatively impact on customer interaction time for all customers.

This does not mean the solutions have no value. The verification software is frequently updated with new policies, helping staff keep abreast with rule changes. The bankers reported that they valued this knowledge resource but as a verification tool considered it an 'additional workload' that they are obliged to use to fulfill management requirements. The branch scanning process still reduces courier cost and related processing delays. In effect then, rather than transforming work practices, the technologies were made at home in the existing workflow. This is not because the workers were somehow being contrary but because the solutions ignore one of the major priorities of the bankers – customer throughput – which impacts the whole workflow.

The BankFlow prototype

Prototype development was going on in parallel to the ethnographic studies. Three successive iterations of the BankFlow prototype were developed to demonstrate different functionality and provide an exemplar of how the technology could positively impact on banking work. The prototypes all include at least one paper-based account opening workflow and the second and third prototypes also include an electronic account opening workflow. In this section we briefly describe the prototypes and where the ethnographic findings had influence on them. We then critically discuss the use of ethnography in this process.

BankFlow is a technology which can scan, process and help verify the forms before sending them directly to the back office. The overall aim of BankFlow was to save capital and operational expenditure for banks: BankFlow enables branches to be set up in remote locations with just one Multi-Function Printer (MFP) with an internet connection. Operational cost will be reduced as daily couriering of documents to the BOPC is no longer required and processing time is not dependent on couriering time.

The first iteration of BankFlow shows that it is possible to use this technology for sending forms between different locations whilst dealing with low bandwidth and intermittent internet connections. It incorporates 1) scanning of handwritten forms 2) image processing to separate form content from background 3) compression and 4) re-applying form background at the BOPC. This prototype was developed without any input from the fieldwork and at this stage there was no particular envisionment of how the technology would fit into the workflow. However, even though batch scanning was mentioned in the specifications it was not designed in to the technology, the focus being on the more innovative and technologically challenging features of the

process. The prototype's main advantage would be to reduce couriering costs and speed up processing time. A post-hoc comment on this prototype came after visiting the BOPC: currently only a few analysts have access to computers. Either all would now need access if electronic forms are to be processed directly or the forms would need to be printed on arrival (introducing extra costs).

The second iteration of BankFlow included 1) support to help bankers verify the completeness of the forms they are submitting; 2) multilingual support – where customers can choose the language in which field names and instructions appear, whilst data entry remains in English; 3) a first version of an electronic workflow – where data is directly entered into the system and the completed forms printed out and signed by the customer (the bank has a hard requirement for signed paper copies). During the design of this iteration, the ethnographer had completed the first interviews in the BOPC and bank branches but had not yet undertaken the observational work. The early findings from these interviews fed into design in two ways: 1) the introduction of multilingual support, 2) completeness verification - the interviews of both branch staff and BOPC revealed that the two key components of FTNR are completeness and correctness. Since checking form completeness was deemed possible although not without technological challenges, the idea was incorporated into the prototype. However at this stage we had no details of what the actual situated work practices were around account opening as the observational study in the branches had not yet been undertaken. The developers therefore choose to focus on the technical challenges that the technology could solve rather than thinking at a system level, unfortunately their instantiation embodied assumptions about the process which turned out to be mistaken.

That BankFlow helps to check completeness is not in itself an issue, but it was how the workflow in which this would take place was envisaged that raises concerns *now that the observational study has been completed*. The envisaged paper form workflow consists of the following: The customer and banker fill out all the relevant paper forms for account opening and collect the supporting documentation. The paper form is then scanned using BankFlow, with the customer present. It automatically checks for completeness i.e. that all the required fields are filled in and for some fields that they contain the right alphanumeric entries. The system will provide details of any missing information, thus it should reduce the occurrence of FTNR, as the bankers can ask the customer for that information there and then. To correct this information the banker needs to add it to the original forms and rescan. The banker scans the relevant supporting documents and the system prompts the bankers to index key fields from the supporting documents. Since the customer is present and sharing the screen they can check the information is correct. Indexing involves entering 4-5 fields detailing the information on that particular supporting document. This reduces the amount of digitisation work that is required to take place in the digitisation centres and simultaneously creates the customer record. If this information is propagated to the various other banking systems, it can reduce duplicate data entry. All information is sent electronically to the back office for final verification and account activation.

We examine this envisaged workflow in the light of the ethnographic findings below but first we briefly describe the third iteration of BankFlow. The third prototype advances the electronic workflow with 1) web-based access so forms can be filled on

larger PC screens, 2) prompting the banker as they enter information on contextually relevant new rules and changes in process 3) pre-filling various fields (branch location, employee code, account type) 4) propagating information between fields.

The prototypes above have been designed to offer some system level advantages such as 1) in an ideal case speeding up new account processing to 30 minutes (although this can only work where there is no queue and everything runs smoothly. It is likely to happen only with high-value account holders if at all.) 2) save courier time and cost 3) make bank branches in remote areas more cost effective 4) reduce the number of data processors in the digitisation centres.

Critical evaluation of BankFlow

The completed ethnographic analysis leads us to have some concerns about how BankFlow will be used in practice in its current embodiment. Whilst the underlying technology idea would not seem to be problematic, the manner in which it has been implemented as a one-at-a-time workflow runs contrary to observed work practices. The paper-based and less sophisticated electronic workflow add time and effort up front in the branch whilst the customer is present with the aim of achieving efficiencies elsewhere. For example, all forms will need to be completed now whilst the customer is present, additionally they will need to be scanned and indexed. Furthermore, where a customer is not approved during verification, the time spent indexing up front is wasted. All this conflicts with the banker's orientation to customer throughput. Any benefit of efficiency in later parts of the process is likely to be outweighed by the delay during customer interaction. It is possible that in quiet rural branches this will not be so much of an issue, although it should be noted that the orientation to customer throughput is individual (keeping this customer interaction here as short as possible) as well as successive (processing successive customers rapidly or overlapping as currently paper allows ability to support any number of customers to reduce waiting). However, if used as intended it would have a greater disruptive impact in busier branches. If this is the case, it is likely to be worked around, just as the existing software verification technology is – relegated to the end of the day, negating some of the intended value in for example verification.

It is also not clear whether costs will be reduced by indexing up front. This idea of front loading is similar to that described in a study of another scanning solution, this time in a medical setting [27]. Both technologies were designed with the idea of making the entire workflow more efficient and reducing the amount of back office processing work. [27] described the resulting shifting around of the work from clerks to (higher paid) medical professionals and how even so there was no reduction in workforce. Similarly here we need to ask whether this is really more efficient? Since indexing is only a small part of data entry, will that really reduce the digitization workforce and even if it does, given that the (higher paid) bankers will now have more work can that really be said to be more efficient[1]? A second question on efficiency in practice also relates to front-loading. The increased workload on every application

[1] See [11] for a related discussion about whether getting rid of PA's is really beneficial when we dig below the easy-to-cost bottom line.

aims to reduce FTNR from incomplete data. However, FTNR (including completeness and accuracy) runs at approximately 15%. Thus every interaction time is increased as a way of detecting a small minority of problems.

This is not to say the system doesn't have value, it should significantly reduce couriering costs and it handles the problems of poor bandwidth in rural areas making banking more accessible. However it is unlikely to realize all the promised benefits at least in the paper-based workflow. The enhanced electronic workflow implemented in the third iteration could however offer benefits, *as long as it is quicker to complete upfront* with the customer than the current traditional practices. We have hope that it will be because it has a number of features to reduce the form filling burden, such as automatic completion of duplicate fields, contextual prompts etc.

However, as ethnographers it is disappointing that the most important findings from our study, that is the fundamental conflict between BankFlows envisaged workflow and the real work practices of bankers could not be incorporated into technology design. Rather only the more minor findings which were easy to implement and which fitted with the current technology conception were taken. The tight timeline and the parallel study and development cycle meant that full value was not made of the ethnographic study, leading to a better systemic solution.

Discussion

In this discussion we make some observations about the use of ethnography for design in parallel to the prototyping lifecycle in an industrial research setting. Whilst the BankFlow prototype has been created, it has not yet been piloted. Thus we don't know for certain what the outcomes of implementation will be. However, as Sacks [24] described technology doesn't change the underlying fundamentals of the work – bankers and customers will still be 'doing banking' whether in urban or rural branches, whether with or without our technology. The technology will have to be made at home with their existing practices. Unfortunately, in this case the workflow design conflicts with some of the fundamental work practices of bankers, instead it replicates the same mistakes as the previous solutions. It seems unlikely that WorkFlow will therefore be used as proposed and thus will not bring its full benefits.

Ethnography in parallel

In this section we critically examine the place of ethnography in the systems design cycle as undertaken here and in comparison to some of the different processes described at the start of the paper. It should be clear that this is a post-hoc analysis, undertaken because we wished to examine the reasons for the limited impact of the ethnographic study in this case in the hope to better impact the future iterations of the same prototype and that others can learn from our experience. Of the different ways of combining ethnography and design described at the start of this paper, the process followed here bears closest relation to the concurrent and evaluative ethnographies. In terms of concurrent ethnography, the timing was off – if the study and analysis could

have been completed either prior to [17] or during the development of the first rather generic prototype [25] the ethnographic findings might have had a greater impact. The problem for us lay in the timing of the studies. The ethnographic analysis revealing how the social organization of the setting was achieved by the members was only completed after certain assumptions, which turned out to conflict with the workers orientations, had been 'hard-wired' into the prototype and were thus considered too difficult to change. In terms of evaluative ethnography, could we not have provided a 'sanity check' of the design requirements in advance, rather than post-facto? Unfortunately, in our case as opposed to the banking project described in [17,16] there was no pre-specified requirements documentation. Furthermore, in [17, 16] not only was the bank looking to buy an existing technology, they already had doubts about its fit, and so were ready to take on board the ethnographers findings. Whereas in our case, there was no single worked out requirements document up front, rather the requirements and design choices emerged over the iterations and unfortunately again the timing of the study was not favourable for influencing design at the point it was needed. The basic technology concept had already been created and at each stage of prototype iteration rather fundamental design decisions were made which were not open to amendment. Whilst they incorporated the findings which could easily be fitted into their existing conception, there was no space for going back to the drawing board or doing a major rethink when it became clear that the workflow design conflicted with the bankers work practices.

Scenic features vs. situated action and the role of ethnography

So is it simply a question of timing? We do not believe so. Certainly timing is part of the issue – the practical problem we alluded to at the start of this paper. However we believe that this practical problem stemmed from a conceptual misunderstanding of what exactly ethnography was *for*. Originally studies were planned to start in advance of the prototype development, but they kept getting delayed because of problems of access. In part these problems were the normal sort of practical problems of access familiar to ethnographers everywhere (changing gatekeepers, negotiations with customers and so on). However, since this project started from an idea for a technology, it was naturally led by the engineers, not the ethnographers, and in hindsight we think that we and they had differing understandings of the role and outcomes of the ethnography. Although never fully formulated it appears that their expectations were that ethnography would help with the look and feel & detailing of the workflow of the interface and was therefore something that could be tacked on later.

In our experience of ethnomethodologically-informed ethnography for design, design is often influenced *both* by the scenic features [8] of a setting and by the deeper understanding of the situated nature of action [8,21,8]. That is, compared to a formal process description which is typically divorced from the work itself, any information about the setting can prove useful in informing design. However, problems can arise when *only* the scenic features of the setting are incorporated. Unfortunately by their nature the scenic features are those which can typically be reported straight off, without the need for analysis and thus made immediately available for the designers. For example, in this case the provision of forms in local languages was an immediately

reportable scenic feature of the setting, whereas the way in which account opening forms were processed to meet the situated contingencies of the work required an understanding of how the social orgnisation of the work was achieved. Furthermore, the designing in of completeness verification in prototype two might be seen as a cautionary tale against using incomplete first impressions and partial results rather than the detailed output of a completed and analysed ethnographic investigation. This is something that we imagine most ethnographers working in industry would have similar tales about. In this case however, the ethnographer had little choice but to provide these partial insights because of the constraints of the prototyping lifecycle.

This becomes even more problematic if systems designers start to believe that ethnography is about the description of scenic features, as this is likely to influence their understanding of what ethnography is *for*. That is, just as one can make a distinction between the scenic features of a setting and the analysis of *how* that setting comes to look as it does, one can find a parallel in how ethnography is used to influence systems design. That is it can be used to influence the 'surface' features of the system, such as the look and feel of the interface, but it can also speak to the fundamental principles on which that system is designed. This has been shown for example in the many ethnomethodological ethnographies which illustrate how technologies end up failing because they do not take account of the users work practices [e.g. 2,5,6]. What our paper offers is a cautionary tale of what can happen if ethnography is not well integrated with the design lifecycle. Ethnography as a starting point in any ideal design process is propagated by experts consistently [8, 21]. Also, challenges such as, time taken, vague & unsystematic methods and communicating broad results [17] are often discussed while integrating ethnography in design process, however not much has been discussed about the consequences a solution can have if ethnography is not preceding and given proportional time and space to fundamentally evolve the system design.

Whilst we still might believe that 'one can always learn something from ethnography' we would urge caution in ensuring at the start of the project that all parties in the collaboration are on the same page in their understanding of and expectations from ethnography. Since if the assumption that all ethnography is for is to influence surface features of the system is put into practice then one is likely to run into similar design problems as if one had not used ethnography at all.

References

1. Bodker, S. & Iversen, O.S. (2002) Staging a professional participatory design practice: moving PD beyond the initial fascination of user involvement. Proc. NordiCHI'02. 11-18
2. Bowers, J., Button, G., & Sharrock, W. Workflow from Within and Without: Technology and Cooperative Work on the Print Industry Shopfloor. *Proc. ECSCW'95*.
3. Button, G. (2000). The ethnographic tradition and design. *Design studies*. 21. 319-333
4. Button, G. & Dourish, P. (1996). Technomethodology: paradoxes and possibilities. *CHI'96*. ACM New York. 19--26.

5. Button, G. (1993). *Technology in working order: Studies of work, interaction, and technology*. Routledge
6. Button, G., & Sharrock, W. (1997). The production of order and the order of production: possibilities for distributed organisations, work and technology in the print industry. In *Proceedings of the Fifth European Conference on Computer Supported Cooperative Work* (pp. 1-16). Springer Netherlands
7. Castellani, S., Grasso, A., O'Neill, J., & Roulland, F. (2009). Designing technology as an embedded resource for troubleshooting. *JCSCW*, 18(2-3), 199-227.
8. Crabtree, A. 2003. Designing Collaborative Systems: A Practical Guide to Ethnography, Springer.
9. Crabtree, A. Rodden, T., Tolmie, P. and Button, G. (2009). Ethnography considered harmful. CHI 2009. 879-888.
10. Crabtree, A., Chamberlain, A., Davies, M., Glover, K., Reeves, S., Rodden, T., Tolmie, P. & Jones, M. (2013). Doing innovation in the wild. *Proceedings of the Biannual Conference of the Italian Chapter of SIGCHI*. ACM.
11. Erickson, T., Danis, C.M., Kellogg, W.A. & Helander, M.E. (2008) Assistance: the work practices of human administrative assistants and their implications for it and organizations. *CSCW'08*. 609-618
12. Garfinkel, H. (1967) Studies in ethnomethodology. Englewood Cliffs, NJ: Prentice-Hall
13. Grudin, J., (1990) The Computer Reaches Out: The Historical Continuity of Interface Design, *CHI'90*, Seattle, Washington, April 1990
14. Hartswood, M., Procter, R., Rouncefield, M., & Slack, R. (2003). Making a case in medical work: implications for the electronic medical record. JCSCW, 12(3), 241-266.
15. Hughes, J. A., Randall, D., & Shapiro, D. (1992). From ethnographic record to system design. *JCSCW*, 1(3), 123-141.
16. Hughes, J., King, V., Rodden, T., & Andersen, H. (1994, October). Moving out from the control room: Ethnography in system design. Proc CSCW. 429-439. ACM
17. Hughes, J., O'Brien, J., Rodden, T., Rouncefield, M., & Sommerville, I. (1995, March). Presenting ethnography in the requirements process. In *Requirements Engineering*, 1995. Proceedings of the Second IEEE International Symposium on (pp. 27-34). IEEE.
18. O'Neill, J., Castellani, S., Roulland, F., Hairon, N., Juliano, C., & Dai, L., (2011) From Ethnographic Study to Mixed Reality. *CSCW 2011*.
19. O'Neill, J & Martin, D (2003) Text chat in Action. *Proc. GROUP'03*
20. O'Neill, J., Martin, D., Colombino, T., Roulland, F. & Willamowski, J. (2008) Colour management is a socio-technical problem. *Proc. CSCW'08*
21. Randall, D., Harper, R., & Rouncefield, M. (2007). *Fieldwork for design: theory and practice*. Springer
22. Rouncefield, M., Hughes, J., Rodden, T. and Viller, S. (1994). Working with "constant interruption". *CSCW '94*, New York: ACM Press.
23. Sachs, P. (1995). Transforming Work: Collaboration, Learning and Design. *Communications of the ACM*, Vol. 38, No 9. 36-44
24. Sacks, H. (1972) *Lectures on Conversation* (Jefferson, G. (ed)). Lecture 3. Spring 1972. 542-553. Oxford Blackwell. 1992
25. Sommerville, I., Rodden, T., Sawyer, P. & Bentley, R. 1992. Sociologists can be surprisingly useful in interactive systems design. In proceedings of HCI '92, CUP. *People and computers*, 341-341.
26. Suchman, L. *Plans and situated action: the problem of human-machine communication*. Cambridge: Cambridge University Press (1987)
27. Vinckhuyzen, E. & Plurkowski, L. (2012) Implementing EMRs: Learning from a video ethnography. *EPIC 2012 Proc*.