

'That's How The Bastille Got Stormed': Issues of Responsibility in User-Designer Relations

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ABSTRACT

This paper presents data and analyses from a long term ethnographic study of the development of an electronic patient records system in a UK hospital Trust – TA 'Dependable Deployment'. The project is a public private partnership (PPP) between the Trust and a US based software house (USCo) contracted to supply, configure and support their customizable-off-the-shelf (COTS) healthcare information system in cooperation with an in-hospital project team. We use data drawn from our observational studies to highlight a range of responsibility issues in designer-user relationships.

Keywords

Responsibility, ethnography, user-designer relations, integration, healthcare

Vic – *"X has drawn my attention to upcoming changes in procedures – it is important that these are done before go-live so they are not associated with the system. If they are done before go-live, the system will be seen to automate and speed this up. If not then you'll have a revolt and that's how the Bastille got stormed."*

Barney – *"They had an EPR (electronic patient record) in the Bastille?"*

Vic – *"Yes they did"*

1. Introduction: Responsibility & Design: 'Life Is Shit, Organised By Bastards'

Ever since the much heralded 'turn to the social' in systems design the responsibilities and relationships between users and designers has been held to be of crucial importance in both designing and deploying information systems. Research and experience appears to have produced a common ethos – if not a cosy shibboleth - in HCI and related disciplines (e.g. CSCW and PD), that it is part of the designers' responsibility to understand those they design for, to understand their work, and build systems with users and other stakeholders participating. In HCI a proliferation of techniques and methods for understanding the user and their work and involving them in design have emerged to enable designers to discharge this responsibility. But whether these ideals about responsibility ever work out in the 'real world, real time' practice of developing and deploying multi-million pound IT projects remains debatable.

Quite how designers might discharge their responsibilities to users is itself a topic of dispute. Out of a miasma of ideas,

beliefs and approaches, ideas have emerged that inform our understanding of the relationships and responsibilities between systems designers and systems practitioners - the notions of designing both *for* the user and *with* the user. In this paper we point to various features of the relationship and responsibilities between users and designers to consider what designing with and for users means in the context of an electronic patient record (EPR) development in a hospital trust in the North of England. In so doing we sketch out some issues in user-designer relations and responsibilities and suggest how the 'Janus faces' of design (Bowers) have multiplied and become ever more intricate. We use our ethnographic observations to suggest that this is further complicated by complexities over exactly who the users are and how they can be represented and accommodated within the design process; to the extent that, to the jaundiced eye, and to the hard-pressed designer, getting users involved appears to often be the beginning and the cause rather than the end and resolution of design problems. The 'real time, real world' issue then becomes exactly when and how do designers (and users) wish to face up to and address these responsibilities and these problems, perhaps best characterised in Arthur Smith's heartfelt and resonant phrase, "Life is shit, organised by bastards".

2. NHS Modernisation and Computerisation

The National Health Service (NHS) in the England is currently undergoing a major period of upheaval, 'modernization' and computerization (a process that has been going on in different guises since the 1980s) (Bloomfield and Vurdubakis, 1997). In this paper we focus on moves to provide comprehensive, integrated computer support through developing and deploying electronic patient records (EPRs) – that all NHS Trusts are required to develop in the next 5-10 year period. The systems are envisaged to enhance medical work not only through better information (accessible at the point of service, more timely, better quality etc.) but also better support of best practice and decision support, as well as providing the means for integrated working (For commentary on the process, problems and evaluation of current EPR systems see Ellingsen & Monterio, 2000; Hanseth & Monteiro, 1998; Hartswood et al., 2001).

Trusts are on a trajectory that requires them to integrate their services electronically with other care providers in their area. At the same time they are required to provide core sets of data expressed in particular ways for national purposes. Integration is then not just a problem for individual Trusts but one that must be worked out in relation to requirements for regional integration with other services, and national integration. The UK Government has instantiated a program to deliver the systems required to achieve this process - the National

Programme for IT (NPfIT). Local NHS Trusts will work in concert with the local service provider (LSP) who will provide a suite of products (not necessarily all their own) which will be configured to the individual Trusts' requirements. As yet the exact contractual and working relationship between Trusts, LSPs and suppliers is not exactly clear but we know that the relationship is one of public private partnership (PPP). In a PPP the private company is contracted to supply, implement and maintain the Trusts' systems for a given period of time (usually 8-10 years). Currently, this program is in its infancy – the LSP contracts have been awarded and work is beginning but is still at an early stage. When the LSP programme was announced certain Trusts that were deemed special cases (i.e. where they had already signed contracts with suppliers and their procurement process was judged to have been sound) were allowed to continue implementing systems outside of the LSP programme but having to conform to national guidelines. This study focuses on just one of these based in the North of England – the 'Trust'. In August 2002, the Trust signed an £8.3 million, nine year, contract with a US software provider to supply, implement and support an EPR system. The Trust currently comprises three hospitals and the system is due to be delivered in 3 phases. Phase 1 (a core administrative and reporting system, theatres, A & E, radiology and links to legacy laboratory applications) is due to 'go-live' this February (2005) after being delayed a number of times since last February. The second and third phases will bring other specialities and GPs on-line, automated pharmacy applications, care pathways, decision support and so on, turning the system into a full-scale EPR.

Our ethnographic study began in May 2003. We were provided with an interesting opportunity to gain access to the design team as they progressed the design, attending meetings of many sorts involving the project team (and particularly the project manager), shadowing, attending testing and so forth and collecting a wealth of material (field notes, tape recordings and various documents). The implementation team – the Trust analysts to which we mainly refer throughout this paper – is made up of an analyst for each of the system areas/modules (e.g. theatres, A & E etc.). It is the analysts in the implementation teams that carry out most of the day-to-day systems work – in terms of specifying what the build of the database should be and then carrying it out, demonstrating it to 'users' and then refining, re-building and so forth. Each analyst is part of a wider team comprising a Trust analyst, a USCo analyst, a team leader (a manager from that area) and various 'users' (medical and administrative staff of various 'jobs' and levels).

Importantly, while this was happening ahead of the schedule of the main NHS programme it is a very similar situation to that which many other Trusts will be experiencing over the next few years and most of the other NHS EPR projects will have a similar configuration of players and technologies involved. An outside (often international) supplier will provide a customizable off-the-shelf (COTS) EPR system to be configured for the particular Trust. This may well be integrated with other specialist legacy applications (particularly for e.g. laboratory work), some of which will have different suppliers. The business of building and configuring the system will be managed in partnership – i.e. a joint project team involving members of the Trust and the supplier. Of course the situation is more complicated since the supplier's analysts and designers essentially act as intermediaries between the Trust and their employers. The design of any system for an

individual Trust is likely to encounter limits as to how much the supplier will want to tailor the system for a given client. The issues we indicate are likely therefore to be generalisable across a number of EPR projects, and may well have relevance to COTS systems in general. We therefore attempt to make some general points about the complexities of user-designer relations in design and project work: the issues of multi-national cooperation in development and deployment and how COTS systems get tailored in massive commercial projects. We also point to how issues of project management, usability and integration are influenced by such relations within a 'real time, real world' commercial project, where 'time is money'.

3. Designers, Users and responsibility: Contractual Relations

The contract is a massive document, developed throughout the 4 year procurement phase and 'finalized' in August 2002 when the Trust signed it with the US-based supplier USCo. It has since gone through a couple of official larger scale 'change contract' revisions and numerous minor alterations. When we originally started the fieldwork the project manager – 'Helen' – pointed it out on her desk, patted it and said what seemed truthfully and ruefully that it was her "*Bible.... and her bedtime reading!*". Although this section is about contracts it is not about 'the law' regarding contracts, the construction of contracts or executive level contract negotiations, although these too would be interesting topics. Rather, it is about everyday design problems and how 'the contract' or what is assumed to be in 'the contract', or what is involved in meeting the contract, figures in project work. But it is surprising how rarely 'the contract' appears in research on user-designer relations given our routine observations that reference to it is a persistent feature of the design process. The 'contract' - the formal, legal stipulation of work and responsibilities - gets dragged into everyday work and used in a number of ways. It provides a formal framework within which, and in reference to, user-designer relations get worked out in practice, for, as with any 'plan' (Suchman ref) how the contract gets worked out in a contingent and rapidly changing world is a product of intense negotiation. In this project a continual feature of the relationship between designers (and designers and users) is the on-going negotiation over where work is, what work is required, and who should undertake it by reference to the contract. Certainly some work specification and allocation is relatively unproblematic. Problems may occur as the requirement for extra work emerges during the development process (as is common), and it may have to be portioned out. When negotiation occurs both sides have room to manoeuvre and they may trade work activities. During such discussions it is common to invoke the 'contract' and take recourse to its specifics.

In implementation team meetings, the discussions involving the 'contract' are relatively commonplace due to its importance in specifying responsibility - who is formally responsible for what - as illustrated in the following quotes taken from talk between the UK analysts and project manager:

"...you can bet that he went back and checked on the contract right away and he was the one who actually pointed out to me that it was in the contract so.. he was going to speed this through"

".. why are they talking to us about cost?.. contractually its on USCo's head"

Attention to the detail of the contract ensures that the organization, through the project team, effectively 'covers its bases' - or fulfills its obligations - ensuring that any (inevitably costly) breakdowns cannot be attributed to the project team or the organization it represents:

"...we have to be very pro-active and keep emailing your analyst and say what do you want me to work on? what d'you want me to do? ..I'm getting nervous for a variety of reasons .. I'm just not sure what they're going to throw back at me .. just want to make sure we're .. covering our bases as well..."

The contract, like any plan does not, cannot, lay out in endless detail exactly what it takes to fulfill it. Ambiguities regularly arise over the definition of actions such as what the nature of 'participation' versus 'direction' should be during the phase of configuration:

"...this goes back to the issue of.. whose responsibility is it to do certain things with setting up and configurationthe expectation has always been that well we would participate in configuration... it was on the understanding that they would be directing that configuration" (UK analyst)

While the UK Project Team may feel that sometimes they end up with more and different work than they read into the contract in a similar manner the contract offers them possibilities for finding flexibility within the formal contractual limits (what Bittner [4] might term 'organisational acumen') to ensure they get what they want:

"...its important that we are getting the things that we require within the contractual limitations and y'know I understand that we have to work within that but if also within that we need to make sure we are getting what we require" (Helen, UK project manager)

While the contract constitutes the 'official' documentation for specifying activities and responsibilities the Project Team also use a variety of other means to 'try to get the best deal' as shown in the following discussion on media manager product (for managing images e.g. from radiology) between Helen (UK project manager) and Peter (senior UK analyst):

Peter – *"what functionality is required, we seem to be getting a lightweight version but we want as much functionality as possible.. we have been given less than we were demonstrated"*.

Helen – *"Let's see if we have a hard copy of what was demonstrated to aid in negotiations"*.

Helen and Peter discuss how their version of 'media manager' seems to have less functionality than that which they were demonstrated, but that if they can find a copy of the demonstration this may aid in asking for more functionality (for the money one assumes). Thus, not only the official documentation of the contract is used as a bargaining tool but also 'unofficial' artefacts like a CD-ROM demonstrator can be used for this purpose to gain leverage on the 'good faith' of a supplier.

Contractual and quasi-contractual issues also impinge on user-designer relations in other ways, in particular through the notion of the 'sign-off' in that 'sign-off' can provide ways of keeping users on board while effectively providing contractual protection for designers. This next excerpt is taken from a discussion between Gail, the UK patient administration system (PAS) analyst, and Alice (her US counterpart). It provides an insight into the way the relationship between

users and designers is managed. Gail begins by stating that it is of 'crucial importance' to get the administrative system build 'validated by the data management group'. Alice's comments are particularly revealing in that she describes the reason for getting the system signed off as being to 'protect the analyst' (the UK analyst) from complaints they might receive about aspects of the system during later stages of design.

Gail – *"PAS, crucial importance of getting it validated by the data management group."*

Alice – *".....the importance of buy in."*

Gail – *"Do I have to fill out a sign off form for each waiting list"*.

Alice – *"No – the reason for sign off is to protect the analyst because without it you can get complaints on procedural changes during testing and go-live... you need to ensure buy in through use of these documents with expert and superusers"*.

Interestingly this process is not described in terms of making sure the design is 'correct' rather it is described as ensuring the users have officially signed up to the design because this undermines any basis for user complaints later on. In this way we see that the design team limit when users can have input into design and what that input will be. Of course, ironically, it may be, and often is the case that users only achieve the requisite levels of skill and understanding of the design and how it will impact on their work towards the end of the design process. This, of course, leads to new requirements coming along late in the day, often when the design has progressed to a stage where these are hard to accommodate, or at least accommodate with any level of elegance. Given that this may be a commonplace feature of design, official 'sign offs' effectively limit possible disruptions later in design (or at least make them more obviously available to monetary renegotiation). Clearly the contract, and what lies within it, is not a passive document that unproblematically prescribes a division of tasks and labour for the development and deployment of the system. The contract will have to be worked with during design as its shortcomings become apparent, problems emerge, new requirements come on line and so forth. When discussing the purpose and use of organizational rules Bittner (1965) urges that research should progress from noting that organizational practice does not and cannot be in "strict obedience" with the letter of rules and procedures to instead look *"... to the investigation of the limitations of maneuverability within them, to the study of the skill and craftsmanship involved in their use...."* In this study we have sought to echo this program but instead of looking at organizational rules we have considered the practical use of the contract – a description of tasks, duties and responsibilities as distributed between a supplier and customer in cooperative partnership. Bittner continues to define organizational acumen as follows:

"Extending to the rule the respect of compliance, while finding in the rule the means for doing whatever need be done, is the gambit that characterizes organizational acumen."

Drawing on this we might consider that a key feature of 'acumen' in project management would be the ability to draw on one's knowledge and skills to masterfully achieve the system one requires within the limits stipulated in the

contract. Clearly the details of the contract always require elaboration into actual work, in practice. The ability to skillfully elaborate what the contract should mean in terms of work tasks and their allocation for the benefit of one's organization and successful bargaining over the contract is doubtless a requirement for project managers in these situations.

4. Design For Users: Identifying Problems

Although users have direct access to the analysts and designers, nevertheless a lot of design and decisions about design have to be taken in their absence. It is consequently interesting to explicate some of the ways in which users are considered in design meetings, how responsibility to users is factored into the accomplishment of the meeting. Design meetings are often about sorting out problems, where the issues often become, 'who are our users and how do we get worthwhile cooperation?'; 'what type of user problem is it and how do we solve it?'; and ; 'whose problem is it and how do we evidence it?'.

4.1 Taking Responsibility: Who are our users and how do we get worthwhile cooperation?

In this example Barney (a senior UK analyst) relates his difficulty in getting the information he requires to build the clinic scheduling application for the new system. He acknowledges the diversity of his user group and the need to include 'many different users' in testing but his design problem is that he does not have the 'correct' information (it is incomplete and in the wrong format) on current process and practice on which to base a new design and he seems unable to access users who can provide him with the information he requires. For him part of the frustration has been that does not know if he is just talking to the wrong person, whether nobody actually has this information, or whether users are deliberately withholding information. Alice (US analyst) suggests that the problem should be escalated ('to the IM & T steering group' – upper management) as a means of putting pressure on hospital staff to cooperate 'properly' with the designers.

Barney – *“For this area we need many different users to test as it is different for different areas. I'm basing the build on call centre information. There's a problem that the build comes from either PAS or how you do it. Information has not been provided in full or in a format to be used so I think I will just have to go on how PAS does it.”*

Alice – *“I think this has to go to the IM & T steering group”*

Barney – *“We wanted to set up clinics the way they work – it would have been magnificent, but have to go to PAS instead. No-one in this hospital is capable of providing a list of clinics.”*

Barney formulates the problem as one in which the users are 'shooting themselves in the foot', i.e. if he could have received the correct information the new system would have been 'magnificent' for the users. This prompts Alice to describe this problem as an instance of a more general difficulty in the design – that the current situation is one where departments or areas operate as 'silos' and that this is having a knock on effect in achieving the desired integration of work processes to produce 'enterprise wide scheduling':

Alice – *“Enterprise wide scheduling would be full integration of a series of procedures, bringing resources together in the 'correct' order to support care.... the system would automatically work out what can be done, when... indicate what is required, as opposed to scheduling that is not seamless across procedures.”*

Thus, the current situation of design is contrasted with design ideals and the lack of achievement of these ideals is attributed to the users rather than the designers.

Alice – *“We need to make a cut-off date.”*

Barney – *“I could do it, all I need is a correct, full data set.....Other jobs got in the way of chasing up the data.”*

Alice – *“There's a real problem of the validation of the data set”.*

Helen – *“There's a problem of change management going on in the Trust right now, particularly in the call centre, there are disputes over how things are currently done and the requirements for modernisation.”*

Barney – *“Well I'm not going to worry about other people giving me the right information as long as its signed off.”*

Alice – *“But I must stress the importance of buy-in from the most tricky people and areas during QA testing.”*

While Barney re-iterates that it is only a lack of the required information ('a correct, full data set') that is stopping him from achieving the design Alice indicates a problem of 'validation of the data set' –when users sign off the data set for the design. Clearly, if there is disagreement amongst users about the data set, such that it has been difficult to collect (for whatever reason), then there may well be problem in getting it signed off. If it is not signed off then there may be problems progressing to the subsequent stages of design. This leads Helen to reformulate the problem as illustrative of organizational struggles to do with 'change management' and 'modernization' and therefore as a problem not necessarily to do with the EPR project alone.

Of particular interest here is the manner in which the designers treat the users as troublesome, and that design involves trying to control when and how the users will be involved. Users are meant to be cooperative in providing the required information that will eventually benefit them in helping to design a suitable new system. However, because of their intransigence to change and integration they are resisting the new system. There is also a concern to ensure that user complaints are minimized during later stages of the project (and that this is a real danger) and that this must be achieved by keeping them on board at this stage. But user involvement is not always welcomed (since user involvement can actually inhibit testing by providing comments that are extraneous to the job in hand).

4.2 Responsibility: What type of problem is it and how do we solve it?

In the excerpt below (from a UK analysts' meeting) the discussion begins with the A & E analyst (Bob) discussing with Lenny (the pathology analyst) the problem that A & E staff may not remember to log out of the system if they are called away suddenly to an incident. It is interesting to see how this problem is formulated. Bob begins by suggesting that since in current practice staff do not log out, they will not do this with the new system. Lenny responds by suggesting

that the new system might log users out quickly anyway once they had stopped interacting with it. Bob then raises the problem that another user might then use the system under the previous person's signature. This would be a concern for both security and the integrity of records.

Bob – *“Because if they've got to log out people will not log out of it they don't now ..”*

Lenny – *“But maybe they won't have a chance because the log in time out will...”*

Bob – *“Well I understand that .. but if it doesn't time out before someone gets their hands on the keyboard, .hh that next action is taking place under someone else's signature”*

Lenny – *“Mm hm”*

Bob – *“And that's a problem”*

Helen – *“Mm hm it is a problem”*

Bob – *“And in A & E, in that chaotic, you know, environment, they will not log out”*

The discussion continues as to whether the problem can be solved technically. Firstly, the analysts discuss whether an optimum time out can be set but dismisses this as the shorter this is (which would suit for security), the more problems for usability (users would inadvertently be logged out when they stopped typing). They also discuss the possibility of using a plug in key device or biometrics for access and authentication but these are rejected for other reasons. We return to the conversation as the project manager (Helen) proposes her 'solution'.

Helen – *“Well and again that is something I mean again this is one of the reasons why we've asked for the IT trainers here as well so that this is ... yesterday I met with the IT trainers and we started talking about some of the issues that we need to make sure that everyone is aware of .. this is one of the key ones . making sure that people log out and understanding the implications because in a fact it's an electronic signature, and that's going to give a print, of where you've been on the system and if you don't log out you're allowing someone else to use that that signature”*

Bob – *“But it's not a training issue.. the fact is that the log out procedure will not be looked upon as important as treating a patient”*

Helen – *“Sure”*

Bob – *“And in that environment they're not going to turn round, and log out, every time they walk away from a PC, I can guarantee that”*

Helen – *“Yeah so .. we need to look at it.. I agree it's not completely a training issue I do think it is partially a training issue”*

We can see in this example one of the ways in which user problems become issues for design. For analysts there is an on-going consideration of what the design is and how this corresponds to their understanding of the work done in the area they are responsible for. Through their discussions with users and observations of work they make decisions about the fit of the system to work practice and raise them as problems when the 'fit' is considered bad. The system logging on and off procedure is described as a bad fit with the actualities of A

& E work – where other duties will sometimes take priority over logging out. The team search for a technical solution and, interestingly, when no workable technical solution is found Helen re-casts the problem as another type of problem - as a problem of current practice - and therefore something to be dealt with by a change in practice. The solution is to be implemented by training that stresses to the users that their personal integrity with the system is compromised if they do not log off. This new conception of the problem, however, is modified by Bob when he re-iterates that other matters naturally take priority in Casualty suggesting that it would not be a question of staff deliberately going against what they were trained.

Here, what is particularly interesting is the 'mobility' of problems and solutions. Problems of usability can be problems to do with the system or to do with the users. In this case the problem is set as a 'system not fitting in with the users/users environment' problem. However, when no easy technical solution can be found it is re-cast as potentially being a user problem – 'intransigence to change' to put it bluntly. But in this case the solution of 'training' is rejected and we reach (for now) an impasse on how it will be solved. In general technical solutions are preferred as they 'solve' the problem, while there is always doubt about how well training will stick and how well users will adapt. However, it is worth noting that when a technical solution is not found (even if the team agree it is a thoroughly technical problem) it inevitably becomes a problem to deal with through user adaptation (hence why workarounds proliferate during the course of a project).

4.3 Responsibility: Whose problem is it and how do we evidence it?

In the previous example log-out was readily accepted as a problem, and while there was a discussion of how it could be technically solved, there was no specific discussion about whether this was the responsibility of the US or UK analysts. In the following example (taken from a joint US and UK analysts meeting) we can see that these responsibility issues do enter into analysts' talk as well as discussions of the means for evidencing problems in the 'correct' fashion for the correct audience. The extract begins with Lenny (UK pathology analyst) discussing how the data entry process for laboratory access to the new system is not 'slicker' and 'smoother'. The problem he refers to is that lab staff are being asked to input five items of demographic data, when previously they only had to input a single code. In consequence the new system will be less efficient, produce bottlenecks and therefore users will view the system negatively.

Lenny – *“If the data entry process does not work in a smoother, slicker fashion there will be bottlenecks which will slow the process and cause problems... we already attract criticisms and problems with GP ordering which will be manually input... It sounds like 5 steps when currently it is only one step – we only take one code”.*

In the next part of the conversation Vic explains that the reason for requiring the 5 demographic details is that the application (a GP (doctor) finder) is generic to the system and requires five items for the Commissioning Data Set (Government requirements). Thus, the reason for the 'problem' is due to requirements for producing an integrated system in line with Government requirements. (Interestingly 'for the purpose of integration' and 'for CDS (NHS/Government)

requirements' become progressively the most prevalent ways designers (both UK and US) account to users the reasons why they must do more work, or the usability is not what desired). This view is partially rejected by Alan (pathology team leader) who takes up the issue of integration but lodges it firmly as being a supplier rather than a user problem. That it is the supplier's problem to achieve integration while achieving the same level of service.

Vic – *“You need to have the ability for other areas of the system – what should be easy is a problem because you risk the CDS integrity”*.

Alan – *“Integration is the number one job...it's how systems will become part of the family... it's an issue for USCo, fitting legacy lab applications to the EPR”*.

Helen – *“Can someone take a stop-watch and time this?”*

Alan – *“It will take twice the time, more personnel and over 100,000 transactions you can imagine... it takes Lenny longer and he knows what he's doing”*.

Helen – *“We need the timing so we can take it up as an issue”*.

Alan – *“It's the same thing for Bob and A & E, it has great importance for system success, if inputters aren't happy, the department's not happy”*.

While Helen asks how long it takes to input the data, so it can be taken up as an issue with the appropriate people, the excerpt finishes with Alan stating that the problem is the same in other departments (A & E), and re-iterating that user attitudes to the system are important for any successful implementation. This builds on the previous example in illustrating the different ways in which a problem is cast, how users' interests (different users' interests) are represented by designers, and how problems are tailored to various audiences. Here the problem is framed and measured in different ways – firstly by Lenny as an efficiency problem that would lead to an interrupted process viewed negatively by the individual users. Vic responds by suggesting that it is inevitable due to the need to integrate processes and to meet NHS requirements (the organizational user), essentially suggesting that it is not a problem to be solved by the supplier. This is turned around by Alan when he suggests that problems of integration *are* problems for the supplier. Helen responds by asking for the problem to be timed– so she can make a case to her superiors (this is the route used to put pressure on the supplier when problems are deemed serious). Here we see some of the 'escalation' techniques used to get a problem identified, categorized and accepted and how the user is represented in this process. For example, by concentrating on individual users, as making sure they are happy is an important principle in this design, or by scaling the problem up by looking at the bigger, organizational picture (100,000 transactions) or suggesting that the problem is more widespread (it also affects other areas) than the doubters might consider.

5. Design With Users: Discussions With Users

So far our examples have dealt with users at second hand. They have shown how the design team seeks to understand and reason about the work of users, how such work fits with the developing system, how to understand what types of problems are thrown up during this process, and how they can be appropriately managed. We have also seen how user involvement is partitioned to particular areas and times in the

schedule of design, how users are dealt with as something that can be problematic to the design process if allowed, or involved in the wrong place, at the wrong time. Now we turn to situations in which users are specifically involved – in this case in QA (quality assurance) and integration testing. Here the main questions posed by users centre around the fit with current working practices, the reasons and justifications for the particular design and the likely training demands to learn to use the system. Such discussions can be awkward for the design team since their scope extends beyond the individual user or user group experiences to touch on difficult issues of system integration.

5.1 User problems: How does this fit with our work, why is it designed like this, how do we learn to use this?

The following excerpts highlight many of the common types of user concerns that arise and how they are addressed. In the first, two of the US staff (Vic and Brad) are 'walking' two of the A & E super-users (Jenny and Brian) through clinic bookings for their department. Here Jenny is evidently unhappy with that fact that to go from one step to another in the workflow 'you have to go through seven screens'. Brad, currently demonstrating the process on a computer, responds that there is a shortcut to avoid the long sequence of key strokes. Jenny replies by re-stating the problem as one where complex sequences of interaction are required for simple tasks. Brad replies by saying 'that's the way it is'. This comment is taken up by the senior US analyst (Vic) who provides a fuller explanation of why the interaction proceeds as it does – for the purposes of collecting the data they are required to by the NHS. He also describes how a series of alternative solutions to this as a problem were tried, listing the reasons why they were not taken up. Following this Jenny poses a few more questions about important functions (to a 'typical' A & E worker) asking whether they are supported by the system.

Jenny – *“There's one field to fill in but you have to go through 7 screens to get to it.”*

Brad – *“But you can just F7 to get to the field.”*

Jenny again voices their concern about the amount of time it takes to carry out actions – complains about *“having to do x clicks to carry out simple tasks”*.

Brad – *“... that's the way it is.”*

Vic - *It's required for the A & E CDS..... A & E visits need to be counted as clinics.”* – Thus mirroring other aspects of hospital work (i.e. so they have a generic form). Vic then explains why other options would not work.

Jenny – *“Can we see a day's schedule... can we tell who's had x-rays.. how do we change an appointment”*.

The next comment comes from Brian, pointing out some buttons on the screen and asking whether they will be using them. Since the system is an integrated one, there is a possibility that for an area there will be functions that are not required (or extra functions may be required). As the subsequent comment by Vic suggests the system may be fairly easily tailored in this respect.

Brian - *“I've a question about the buttons... do we use these (and points to some of the buttons).”*

Vic – *“We'll have to check whether they have any values or we might be able to switch them off.”*

Jenny – *“This is the first time I’ve seen a clinic, before they’ve never been working so I’ll need to go back and practice it.”*

Helen – *“You need to fit in with the Trust that’s why it’s like this.”*

Brian – *“But it’s a problem that fitting in with the Trust involves more work.”*

Helen – *“Anything we can streamline we will... in the future with USCo... and you have to realise the importance of data gathering and sharing information across the Trust.”*

Helen adds to Vic’s point about NHS requirements by stating that another part of the reason for the design is to ‘fit in with the Trust’, i.e. for the purposes of integration. Brian responds by stating what might be considered the classic problem between designing to support local practice and the constraints placed by needing to integrate processes – meeting the demands of integration is seen as a problem when it means extra effort by local users. Helen promises future efforts to ‘streamline’ things before again stating the case for integration. But then Jenny persists in describing her concerns with the new system:

Jenny – *“I’ve been trying registration for months and have a problem of getting lost and not knowing where I am and I’m worried about how much training for our receptionists will be required.”*

Vic – *“Could you drive (control the computer) and show us where you are getting lost?”*

Jenny notes that even though she has been practising ‘registration for months’ she still has difficulties, and these involve ‘getting lost’ on the system. To her this suggests proposed training for receptionists may be insufficient. This triggers a discussion regarding the interfaces and interaction sequences required by the new and old systems. The old system simply took the user through a series of screens where they filled them out item by item. The new system requires navigation back and forward and in and out of menus. For Jenny and Brian the new system is harder to learn, less straightforward and easier to get lost/confused with. Finally, Vic and Helen reiterate their comments about the need for organizational and systems integration, and that the information is required by the Trust:

Helen – *“This is a Trust wide system, you get the benefits of the information gathering of other people so you need to do this....As a teaching hospital we need to do research so we need good data...since there are no A & E people on the PAS team I’ll now put you on as stuff like this is a PAS requirement so it will help you to understand and keep informed of decisions.”*

Vic – *“If a patient is sent to A & E from elsewhere you won’t need to fill in these details as they will have been done elsewhere so you do get benefits.”*

As a ‘Trust wide’ (integrated) system, the extra information gathered is often of benefit elsewhere, and since the hospital is a teaching hospital (required to do research) it needs ‘good data’. Furthermore users in any particular department will receive benefits from others as well as doing extra work to benefit others. In this long example we can see how the analysts try to sort through different types of problems that are raised as they take the expert users through their workflow for the purposes of integration testing. When expert users single out aspects of the design and workflow that produce

more work for those inputting data – that involve more steps of interaction or more data collection than is presently the case - these are presented as unfortunate by-products of the constraints placed on the design by demands for integration and satisfying new NHS requirements. However, such reasons may also be proffered when the analysts believe the problems to be clinically insignificant or as something that may be dealt with by training and during the domestication of the design.

Issues of fitting new systems to working practices also surface in these next excerpts that come from discussions during integration testing for the patient administration system (PAS) team - whose leader is Christine:

Christine - *“There’s a problem of doing QA’ing when you’re QA’ing something but you don’t actually know what you’ll be getting... ‘cos they don’t have a PAS system in the States... it’s like fitting a square peg in a round hole... in America they just go ‘have you got the money – bang’.. at the end of the day it’s our managerial problem so we need to start thinking of workarounds... we have to rely on the Trust when they emphasise the clinical suitability of the system.”*

While analysts explain the complications for users as attributable to requirements for integration within the hospital and the NHS, Christine attributes them to trying to fit a US (insurance and payment) oriented system to the UK – ‘it’s like fitting a square peg in a round hole.’ She casts the problem as one of PAS having to make the adaptations (workarounds) to fit with the system on the basis that it will fit clinical requirements. This is illustrated when Gail (PAS analyst) describes the model for patient allocation to orthopaedic consultants. The system is set up to allow doctors to monitor their lists of allocated patients with the feature that they can reject or accept them. In previous discussions users had flagged this up as a problem, since doctors are not necessarily thorough and their secretaries often prompt them on their responsibilities. Consequently, the workaround, that consultant’s secretaries would also have access to these lists is introduced by Gail:

Gail – *“When a patient is allocated to an orthopaedic consultant it goes to his queue but if consultants don’t answer/accept requests they also sit together on all secretaries queues’ so they can monitor if appointments aren’t being picked up by consultants.”*

Christine – *“What about generic referrals where we usually allot to the shortest waiting list.”*

This, however, is not taken as a complete solution by Christine and instead provokes her to raise further problems of the fit of the system to the work of organizing clinics. Firstly, she raises the problem that the system is not set up to allow them to allot patients to the shortest list, instead only to a specific consultant. The next comment from Christine highlights one of the major problems of implementing an integrated system when previously workers have used dedicated systems. Since the new system has a number of generic applications that dictate, for example, how resources are ordered and activities scheduled, local workflow must integrate with these. This means that users often complete some details on one screen then move to these generic applications. This means that the flow through the system appears more complicated as screens and menus are logged into and out of. Christine explains the process of learning interaction sequences with the new system to her user group by using an analogy:

"I imagine it's like the map of the tube (London Underground Trains)... (she gestures as she speaks) you go along and sometimes you get off here, go up there, and back, to get to there... it's not a completely linear process"

Christine's final comment (below) also takes up on some of the previous themes throughout the analysis. As noted before, the UK project team are instructed to ensure the buy-in from the UK users by getting them to 'sign off' on the stages of the work. Indeed, refusal of an area to sign-off represents a major problem for the project team as this could provide a legitimate reason for users to reject the design. No doubt Christine is aware of this when she states reluctance to sign-off testing:

Christine – *"We don't want to sign this off before we go through everything in the proper detail... we are not fully happy about accepting that training will sort out all of these problems... some of them seem like major problems."*

Just as when she did not want to sign off QAing before the system was finished, here she states her reluctance given that testing has not been conducted in 'proper detail'. Interestingly, she is only sticking to getting things carried out as the project schedule dictated – 'the system would be built, then it would be QA tested until users and designers were satisfied, then integration testing would proceed'. For UK and US analysts there is an acceptance that the idealisation of design as discrete phases is only something to be worked towards serving as a means to measure progress. But this is not necessarily the case when users are involved. Although they may concede the need for compromise, as we have seen they can throw the 'structure' and 'methods' of design back in the faces of the designers by insisting on following the plan. And, of course, they are both entitled to and may also be wise to do so, to ensure they have the best design to suit their needs.

Another point to note is the issue of whether training will solve all the difficulties encountered. While it appears inevitable that problems, particularly when deemed clinically unimportant, and technically difficult to fix, have to end up being solved by training, workarounds and so forth, it is important that users do not feel that problems are being trivialised and merely driven down to a training issue. This is part of a more general issue of how information is presented to users throughout the design. This is not simply a question of honesty, as obviously a whole lot of translation (of technical and theoretical details) between stakeholders goes on all the time. However, as the design progresses, and as users become more knowledgeable and involved, they can begin to be more militant, and see where explanations fall short. This suggests that there is a need to communicate in a more sophisticated manner with them as the design goes on. But also it raises questions about how, for example, 'sign-offs' work – how can you expect users to be bound into signing off stages when the stages do not flow in the manner specified? While these matters are usually and eventually worked out they can become serious sticking points.

6. Discussion: responsibility Issues in Designer-User Relations - 'That's How The Bastille Got Stormed'

As IT systems become steadily more complex and organizationally embedded the challenges of and for design increase. Achieving systems dependability is of crucial importance since research has already indicated how systems can be disastrously, often fatally, unsuccessful. As with the

EPR system reported in this paper - progress in dependable design depends on understanding the fundamental problems that arise in attempts to build systems involving complex organizational interactions. Our interest is therefore in developing improved means of specifying, designing, assessing, deploying and maintaining complex computer-based systems in the (often mundane) contexts where high dependability is crucial. It is an old refrain from researchers using ethnographic studies (like us) that the details of work achieved as a recognisable social accomplishment explicated by our studies can inform the better design of systems. In this case we have not studied the healthcare and administrative work to be supported by the system but the work of those delivering the system. Our experience suggests that such an approach can provide useful information about how to effectively target our ethnographic research in a complex setting like this. Firstly, ethnography could be particularly useful when considering integration and 'hand-offs' – the points where processes pass between one part of the organisation and another – the non-integrated parts. This provides better understandings of how processes mesh (or not) with one another and the work required (by talk etc.) to bring things into line. Secondly, problem targeted ethnography could illustrate and evaluate issues of practice to aid stakeholders in sorting out problems (what exactly they are and how serious they are) and which organizational and systems features it is important to support and what might be less relevant. As such it presents further support for the ideas of 'corealisation' (Hartwood et al) which challenge conventional presumptions about IT system design and development practice, the organizational division of labour, and temporal and organizational divisions between designers and users.

This paper has considered some of the difficult issues in what is fundamentally mundane, everyday design work. It is certainly no news to point to ways in which design is enmeshed in organizational processes, involve various (ultimately political) alignments and are practically resolved. Nevertheless, our sympathy went out to the Trust employed analysts (on whom much of our research is based) - stuck in the middle between users (in all their diversity) and the US analysts. They understand the workings of the Trust and the people within it but also the constraints of design and the problems that USCo face in trying to achieve a workable solution. They are caught in the push and pull of developing and changing user requirements which become better articulated, and it may be argued, more insightful the later the project goes on, while understanding that the design conversely needs to become more stable (and closed). It might be easy to proclaim that at least some of the difficulties in this project could have been avoided by understanding users and their work practices better, by better management of user participation, by better design methods and process, by procuring another system etc. However, this is the real world, real time design of a complex system, in a setting where design is constrained by budgets, by time-scales, by personnel numbers, by expertise, by knowledge of developing methods and by a welter of organizational features. In this context participation is unlikely to be the simple, convivial, activity idealised in academic research. Getting a proper idea of who your users are, how they can be stratified, how their requirements can be assessed and prioritised, how they can be trained, cajoled, nurtured and so on is a real problem that must be worked out as the project progresses - and may (just) stop

the 'storming of the Bastille'. Our long term observations suggest that even with the best intentions there is rarely time out to sort this out before the project starts. While drawing attention to these 'intractables' of design we would like to indicate some of the ways in which we think some of these difficulties could be addressed with minor interventions in this type of setting – hopefully aiding those faced with similar design tasks in similar environments.

6.1 Users, Participation and Training

"There is a limit to the extent to which you can seek to design procedures for doing a job without having to depend upon the good sense of those who are to follow them" (Button and Sharrock)

Why do users often fail to participate in integration? Traditionally it has been seen as too technical. Users are good at telling you what they do now but not at comprehending technical considerations – instead, the work of integration involves the project team deciding what compromises or alterations need to be made to local instantiations of the system in order to satisfy integration requirements. This can cause consternation amongst users as they see their interfaces changing form and appearance from exposure to exposure. Involving users in the rationale of decision making around integration might better allow the project team to sort out what needs to be supported in the design. In order to do this successfully there needs to be an undertaking to train users in technical aspects of design so they could appreciate the difficulties of accommodating specific local requirements and generic modelling of integrated processes. However, the effort might well be worth it for two reasons. Firstly, users become more and more capable of understanding and articulating their requirements as the project goes on. This is partly a matter of learning about systems and design as the project progresses and partly about the provocation that comes from seeing successive versions that allows users to match the system to what they do now and have now. Training in technical aspects would hopefully allow a more sophisticated appreciation of the system earlier on in the project. Secondly, one of the big problems for the project team is working out whether reported issues to do with usability are serious or not, i.e. 'would this really have an impact on care, and how much time should be spent trying to solve the problem technically?' Better trained users could better elucidate these issues.

6.2 Integration and Dependability

The requirement for integration is one of the key design problems in this project. Trust wide applications, like the replacement PAS system, clinic scheduling, etc. have caused some of the greatest difficulties for the project team. The off-the-shelf system already contained generic models for these processes but adapting this for the requirements of the UK NHS, this Trust and the local users has been traumatic. Quite apart from the fact that requirements have constantly changed during the development, not least as previously 'unknown' users (and their requirements) become apparent, balancing the ideal of supporting the multi-fold current local practices against the need for core standardization to integrate processes has been fraught. Given the benefit of hindsight this problem would have been foregrounded as a major issue prior to design. The Trust may have accurately felt that they could not afford the luxury of taking a time out to work out how previously ad hoc (talk and document supported) integration would integrate electronically, and instead that they had to use

the EPR project as a forcing device. However, might they have tackled the problem differently? As we have seen in our examples, users participate in design where it concerns their work, and as such evaluate design against current working practices. Change is judged as good when it appears to make things easier. Given their circumscribed role in design, it is little wonder that users may seem intransigent and skeptical when told that their personal compromises are for others' benefits and it may lead them to fear transformation and cling to current practice. This suggests a need to involve users in other parts of the design. Most obviously in designing the models for integration – as this will allow them to appreciate the tension between generic and specific requirements and in doing so may allow better sorting out of which local requirements are necessary and which might be transformed. It may also encourage them to appreciate how integration may benefit others and in doing so 'get them on board' more effectively.

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