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Barriers to Design in Healthcare

Anne Ticehurst, James Ward, John Clarkson

Engineering Design Centre, University of Cambridge

RESEARCH

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Corresponding Author:
Anne Ticehurst
Engineering Design Centre,
University of Cambridge,
Trumpington Street,
Cambridge CB2 1PZ, U.K.
at451@cam.ac.uk

Abstract

Background
Health advisory bodies have suggested that external disciplines such as engineering and design, with their creative, structured approaches to user-focused problem solving, may contribute useful tools and techniques to healthcare service designers. However if external disciplines are to add value to healthcare systems, they need an understanding of current service design practice, and of the environment in which healthcare service designers operate.

Method
In this ongoing study, using a grounded theory approach, data were collected from 20 anonymous participants connected to a UK NHS hospital. Semi-structured interviews were used to gather information on current design practice within 79 change projects, focusing on requirements elicitation. Open coding produced over 400 codes, organised under four main categories: Projects, Requirements Process, Design Methods (including tools and techniques), and Stakeholders. Via further analysis using theoretical memos and axial coding, the topic of barriers to effective design emerged as a strong theme that is discussed further in this paper.

Results
Pragmatic barriers to the effective use of design include issues such as high impact of change, difficulties engaging stakeholders in design activities, cultural and behavioural differences, and problems with inherited systems. Such barriers reflect the highly complex nature of healthcare. Staff adopted a variety of approaches to help resolve complexity, but negative emotional reactions to the use of design methods themselves invite further investigation into whether their cause is the tools themselves, the types of projects they are used in, or the conditions in which they are used.

Conclusion
This paper concludes that if design thinking is to become more prevalent in healthcare, there is a need for more awareness of, and investigation into, the interplay between pragmatic and emotional barriers to design.

Key Words
Design; Engineering; Healthcare; NHS; Service Improvement; Barriers.

Background
The emphasis placed on clinical effectiveness in the 20th century resulted in healthcare systems that were lacking in evidence-based patient-focused service delivery and management (1-3). In order to improve the delivery of healthcare, it was felt lessons might be learnt from other industries. In the UK, the English NHS Modernisation Agency and its successor, the NHS Institute for Innovation and Improvement (NHS III) have been evaluating how applicable design practices from manufacturing and other industries are to service improvement and innovation in healthcare (4).

There are many definitions and interpretations of the word “design”, dependent on the context in which it is used. It can be a noun denoting the outcome of a creative process (5); as such it is commonly used in association with physical objects. Alternatively, in the context of design practice it is used to describe the process that creates both tangible objects and intangible services; the latter of which can be described as a creative yet methodological approach to problem-solving, using structured, iterative design processes or techniques to deliver user-focused improvements (6-8). The outcome of the process should take into account the goals and values of all stakeholders, the “people and organisations who may affect, be affected by or perceive themselves to be affected by a decision or activity” (9). This can be challenging for healthcare service designers, the people tasked with improving healthcare service delivery, who face increasing demand from a long list of stakeholders whose goals and values vary significantly (10); and whose expectations are high. Eliciting their needs, and documenting existing or planned processes to gain shared understanding and agreement for improvement, is an

important step in the design process.

Prompted by healthcare's expression of interest in design, design researchers are looking for opportunities to test and adapt existing methods and tools, such as structured design processes, and visualisation techniques like process modelling that help enable the understanding and communication of complex issues. But while many research interventions show initial benefits, the sustainability of both interventions and benefits are often unrecorded and their long-term suitability unknown (11). Before attempting to introduce design methods and tools, it is not only useful for researchers from outside the healthcare field to understand current design practice, but necessary to understand the context in which it is carried out.

Method

The study, performed by the main author, has been approved as a Service Evaluation by a NHS Regional Ethics Committee and by the NHS hospital trust where the study is being carried out.

Theoretical frameworks for design research emphasise the need for descriptive studies to influence and validate the creation of suitable design methods and tools (12). This study comprises the first three stages of Eckert *et al*'s Eightfold Model of Design Research (13) (Figure 1), aimed at building rather than testing theory:

1. An empirical study of design behaviour: the gathering of data on how design is being carried out in the chosen environment and on any problems associated with it. In this case, data were gathered on a range of service redesign projects within a large NHS teaching hospital.
2. Evaluation of empirical study: a qualitative analysis of the data collected in stage one.
3. Development of theory: expressing the understanding developed from the first two stages in the form of a written narrative.

Grounded Theory was selected to support the need for an inductive approach (research leading to theory) as opposed to a deductive approach (the testing of an existing theory). Other than an initial literature review looking at design approaches in general, and at the use of requirements elicitation in healthcare service improvement projects, literature was reviewed on an ongoing basis dependent on emerging concepts.

Data collection consisted of semi-structured interviews using a topic guide that focused principally on the requirements elicitation stage of the design process. The topic guide was derived from a literature review of design approaches, an exploratory study of service improvement workshops in the hospital, and from feedback from demonstrations of three types of modelling tools.

The 20 interviewees who participated anonymously in the study were all "healthcare service designers"; i.e. members of clinical and managerial staff from inside and outside the hospital who had actively participated in service improvement and innovation projects. 10 of the participants were in management positions and 10 in clinical practice.

A variety of sampling methods were used as the study progressed. Initial interviews used convenience sampling, with the aim of using theoretical sampling (14) for the remainder of the study. As the study progressed the advantage of personal introductions became apparent, and a pragmatic combination of theoretical and snowball sampling was adopted, selecting participants from lists suggested by previous interviewees, based on their relevance to emerging themes and on the types of service delivery projects they had been involved in.

Seventy-nine change projects were discussed, covering a range of outcomes that included changes to the delivery process, to clinical practice, to staff behaviour and organisational culture, and to buildings, equipment and technology. The scale of projects ranged from local ward-based initiatives to capital development projects such as hospital-wide ICT projects and the design of new hospitals. At the start of the study there was no preconception of the types of projects participants had been involved in, however the need to understand more about different types of requirements elicitation techniques led to project type becoming a factor in participant selection, as the study progressed.

Interviews lasted approximately one hour, although some participants were interviewed twice to gain longitudinal views of projects. Permission for audio recording was obtained from eighteen interviewees, and notes were taken with the remaining two.

NVIVO 8, a computer aided qualitative data analysis tool, was used to store and organise data, and to support coding and memo writing. Open coding, by the main author, resulted in over 400 codes organised under four main categories: Projects, Requirements Process, Design Methods (including tools and techniques), and Stakeholders. Axial coding resulted in several emerging themes, one of which reflected comments made by participants about problems that prevented them from working effectively, i.e. barriers to design in healthcare.

Results

Problems raised by participants were re-coded into three main headings: Organisational, Process and Stakeholder. A sample of these problems, selected by prevalence, is discussed below.

1. Organisational

Three organisational issues are discussed here: speed and volume of change, time available for redesign activities, and diversity of working practice.

Speed and volume of change

Participants spoke of the difficulty in getting requirements right in a climate of constant change. There is a risk of obsolescence by the time large capital projects are

implemented, due to intervening changes in demand, technology and working practice. Responding to these changes during a project can carry high financial penalties, particularly in PFI (Private Finance Initiative) projects where contracts tend to be inflexible and overruns can be subject to intense public scrutiny. One participant, with experience of projects in both the public and private healthcare sectors, felt that the NHS needed to learn from the private sector, which has shorter timelines:

"*the biggest thing one wants to do with process in the public sector is to reduce the timeline … the timelines are just so long and I suppose you need a bit more sort of autocratic approach to do that, which we don't prefer, we're such a very democratic sort of organisation and a very bureaucratic organisation*".

Smaller projects, which don't have to follow the mandatory methodology set out in the UK public sector's Capital Investment Manual (15), can progress more quickly. However this lack of enforced rigour can also lead to obsolescence; a brand new ward needed to be redesigned almost immediately, following the introduction of same sex accommodation targets, a requirement that might have been anticipated had patients not been excluded from the design process.

Ten participants mentioned frustration with constant change, but others accepted that perfect results are rarely achievable in a human activity system: *"a lot of this change stuff is like dealing with an amoeba, it keeps changing. And you've got to be able to manage that and be comfortable with not having black and white answers to everything".* Unpredictability and emergence, characteristics of complex adaptive systems (16), required a "*no-blame culture*" and "*a cycle of review and monitoring … so the PDSA* [Plan Do Study Act] *type cycle*". Yet despite the need for continuous improvement, project facilitators mentioned the difficulty of handing over responsibility at the end of a project to clinicians who may have insufficient skills, time or motivation to deal with redesign cycles like PDSA. Clinicians who had been involved in successful projects that used creative problem-solving techniques were seen as more likely to become "*champions*", but many were less able or willing to maintain process maps or to work collaboratively without strong facilitation.

Another change-related issue raised by participants related to the workforce, specifically the higher turnover of managerial staff compared to clinical staff. Clinicians were described as paying lip service to design activities, doing the bare minimum in the knowledge that when managers left, projects were unlikely to be sustained, and a new cycle would start when new managers arrived. In addition to this, facilitators spoke of concurrent change causing confusion, with multiple and sometimes similar initiatives carried out at the same time on the same ward. They spoke of the difficulty of motivating staff and of engaging them in new activities, in the face of "*change fatigue*" and a lack of clear outcomes.

Time Available for Redesign Activities

Reducing the timeline of projects, and hence the risk of change-related obsolescence, was a challenge for participants who work full time as clinicians and who struggled to find additional time for redesign work. Even when motivation was high, time was an issue: *"everybody's very busy you know, clinically they are very very busy ... you know they are stretched and stretched and stretched, beyond, with what has to be fitted in".* Facilitators said that project meetings were often cancelled because staff were unable to leave clinical duties. They spoke of the difficulty of co-ordinating diaries:

"*People felt that wherever possible [we] should make use of existing meetings rather than taking people out as an extra thing…which was quite a tall order really because trying to get an hour or an hour-and-a-half on someone else's existing meeting agenda is next to impossible. "*

There was a reliance on participants carrying out service redesign work in their own time, but this required them to be sufficiently motivated and convinced of the benefits.

Using email to reduce the need for group meetings worked well in some small projects, but not all staff had access to computers at work, and others spoke of not being able to manage the burden of emails on top of clinical work, and of feeling left out of the process.

Because of the difficulty of dealing with groups, either through meetings or electronically, facilitators spoke of having to abandon their plans of mapping and diagramming activities and of reverting to one-on-one meetings and textual documentation, with what they felt was a corresponding loss of innovation. Others spoke of constantly having to adapt techniques, of risking a loss of motivation as timescales lengthened, of implementations being "*assassinated*" if representation wasn't achieved for every group affected, and of having to skip important stages of projects.

Monitoring and validation are important sources of requirements to feed into the continuous development and improvement cycle, but the scarcity of clinical resources jeopardised feedback from completed projects. Every Integrated Care Pathways (ICP) project that was discussed was struggling to find people with sufficient clinical understanding to undertake variance tracking, i.e. documenting and analysing deviations from prescribed patient pathways. A senior consultant stated that only he and one nurse specialist had sufficient knowledge to analyse why patients' treatments deviated. Whilst most understood the importance of the variance tracking process in maintaining the usefulness of ICPs, many felt it would eventually become unsustainable, and that the lack of feedback and improvement would lead to ICPs becoming out-of-date and potentially obsolete.

Diversity of Working Practices

Service designers spoke of difficulties finalising service requirements when they needed to take into account different methods of working. They spoke of carrying out

minimal up-front requirements analysis, and of relying on feedback following implementation to identify needs. This was common at ward level, with small but high-risk changes to patient care, and required close post-implementation monitoring to ensure nursing and medical staff were each able to operate safely and efficiently with new equipment or procedures.

The lack of standardised working practices at individual and ward levels was also found across clinical units and other hospitals:
"If we were to introduce a change here, if you picked it up lock stock and barrel and took it to [another hospital], it may not work, and part of the reason it won't work is because you have different work forces, you have lots of different things"
"you don't keep reinventing the wheel by starting from scratch every time, but you have to adapt it for your environment and that's why I think through the health service there isn't very much of 'you will do such and such' because every environment is slightly different".
However some said this led to extremes, describing a "*not-invented-here mentality*", and a desire to be leading edge, both of which were time-consuming. As one person said, the best innovators "*are the second people to do it, not the first*". The need to adapt service practice to each unique environment emphasised the need for a thorough requirements analysis and a good understanding of current local practice.

2. Process

Two issues affecting the design process itself were problems understanding current processes, and the difficulties of dealing with complexity.

Current processes

Although most of what happens in service improvement is redesign rather than original design, some facilitators felt that focusing on problems with current service processes stifled motivation and innovation: "*people that are successful, are really clear about where they want to get to, not where they want to get away from*". They preferred starting requirements definition with a blank page and a positive vision of the future. Others felt that this presented too great a challenge due to its greater reliance on team meetings, and said that examining the current state of processes worked better with participants: "*they didn't like the blank sheet of paper*".

There were, however, difficulties in understanding the current state. Historical data provides useful input to the projection of future needs, yet data validity problems are a known issue in healthcare design (17-19). Although one manager said lack of reliable and standardised data was often used as a smokescreen to cover fear of change, it was raised by others as a contributing cause to lengthened project timescales. A trial of a new capacity and demand modelling tool within the hospital produced false results due to data entry errors and the misunderstanding of clinical codes by clerical staff, and interviewees reported unexpected high demand and insufficient budgets for new services as a result of invalid and unreliable data.

While more recent interviews show new performance management tools have increased confidence in current performance data, designers still reported gaps in other types of data. One participant spoke of not being able to find any data at all on medical equipment usage, resulting in inaccurate forecasts, and a lack of standardised clinical documentation was reported both within the hospital and within the organisations that fed patients into it. This made it difficult to understand the current patient pathway:
"*that was really difficult and I had to think of ways that I could try to map that, because it's not available, and it's so varied, and staff have different views of … what's the best route in, the patients all have different routes then. So how I started doing it was … we did an audit of 50 patient notes to try and sort of map out where they came in on, and in the audit we found out that documentation was terrible, if not it doesn't exist, which if we were taking in 150 emergency patients a month and we don't know where they're coming from but that their average length of stay is eight days, we are looking at 1200 bed days and 70% of them we don't know why they're coming into hospital in the first place*".

System complexity

Participants were aware of the difficulty of describing and mapping complex patient pathways but weren't aware of alternatives: "*we're not really sure how to address those that are not happening in a linear fashion. A lot of the focus with pathways has been on surgical pathways because it is more straightforward, it is more predictable, by the nature of the care and the intervention, so they are generally quite linear. But now that we're getting on to the more medical pathways it is a challenge".*
The complexity of medical pathways, such as the gestational diabetes pathway provided by one participant, led many to feel that it was not feasible to create an ICP document or model that could accurately prescribe a standard treatment path. There were concerns that trying to do so would increase risk, lead to loss of clinician autonomy, and create poorer standards of care: *"there is one worry that I have about it, as do a lot of people, that we are creating a non questioning method of working, and that people are not thinking, because they can just follow the ICP, whereas in practice you actually want people to question what they're doing".*
Despite resistance to the outcome of the ICP design process, they felt the process itself led indirectly to a better patient experience, with greater understanding of roles and responsibilities, and a resulting elimination of duplicate activities and patient touch points.

3. Stakeholders

The view of all participants was that a senior clinician was needed to drive activities within service redesign projects, otherwise "*it just won't happen*". But in addition to the time constraints discussed earlier, other problems with engaging clinicians in the process were raised, such as the difficulty in finding an acceptable common agenda, and resistance to

certain types of service design tools and techniques. Participants also lacked a common understanding of design methods due to different sources of advice and training.

Lack of common agenda

The historical distrust between clinicians and managers (20-22) acts as a barrier to design. While there was evidence of mutual respect between individuals, there was also a strong sense of frustration about conflicting agendas between those directly delivering care to patients, and those managing the healthcare delivery process.

In general, clinicians in the trust were thought to adapt well to changes in clinical practice, where goals were clear and evidence was available from within their own profession. But improvements to service delivery provide less obvious benefits to patients, and are less acceptable to clinicians when agendas come from outside their profession and are termed in "*management speak*":

"*A lot of the language now of the NHS is about efficiency, cost effectiveness, evidence. That language is important but it stifles creativity and flies almost in the face of something that drives, I would want to believe, the majority of people who work in healthcare, which is a desire to bring the best on a human level to people*".

Managers, whether senior executives or ex-clinician middle-management, were seen by clinicians as too far removed from the "*coal-face*", and projects focusing on management targets struggled to gain vital clinical support. One facilitator described how she had prioritised ICP projects with high volumes and where the length of stay was high compared to other hospitals. These were the projects that failed due to lack of co-operation, because clinical leads were more interested in clear clinical improvements than what might be perceived to be efficiency targets. Facilitators were left frustrated; with many pointing out that reduced length of stay was a quality as well as a cost issue, with evidence suggesting many patients fared better if allowed home as soon as possible. Managers said that clinicians failed to look at the big picture, and that by focusing only on the patients in front of them, they were not addressing the patient pathway outside of secondary care, or the NHS's responsibility to the whole of the population: "*because sadly, if we focus on the individuals, the middle and higher classes do better than the lower social classes, and that's why we have health inequalities*".

At an organisational level, and amongst many project facilitators, there was awareness of change theories including the Kubler-Ross model of the stages of grief and acceptance (23) and Beckhard and Harris's Change Equation (24), aimed at understanding and reducing resistance to change. As one facilitator said *"they've got to see that this is an advantage to them, they've got to see the benefits and they've got to identify the benefits. So they've got to say, if we … do this, this is what we're going to get. We're going to get a better patient journey … so it has to be with the currency of their work, their system, that's what they're going to get into".*

However it was not clear how well these approaches were working within individual change projects, with facilitators talking of having to adapt their language, disguise goals and sometimes "manipulate" clinicians to gain co-operation.

Design tools and techniques

The manager/clinician divide influenced the techniques used to gather requirements. Facilitators had positive views of mapping patient pathways, saying it helped define problems and break down complexity. But doctors, viewing it as a management technique, resisted both it and similar graphical design methods. There were strong emotional reactions from senior staff vital to the process. A clinician leading an ICP project described the words 'process mapping' as "*management terminology*" and "*jargon*" which was seen as "*off-putting to the point of anxiety and antagonism*". Another stated: "*I don't want to draw pictures of processes with circles and arrows; I don't understand that, that's not my skill*". A medical consultant emphasised that the reason she had gone into her chosen speciality was because she was a "*face-to-face communicator*". Using different skills and having to focus on redesign rather than patient care appeared to challenge clinicians' sense of identity and profession. Facilitators spoke of having to take care with terminology: one said they used Lean Thinking techniques to redesign wards, but couldn't call it that due to potential negative reaction.

Discomfort with design methods increased with lack of training, with the most fear and antagonism expressed by those who stated they'd had no formal training of redesign techniques, and whose clinical training had not included service improvement. Most managers had received formal training and were comfortable facilitating large groups and using creative and visual problem-solving techniques, designed to ensure all views were represented equally. However, even when they were able to engage clinicians in projects, they found it hard to use the techniques they'd been trained in, stating lack of time and resistance from clinicians:

"*There are some doctors who don't particularly like the idea of brown paper and chevrons* [modelling tools used by some facilitators, where chevrons are the equivalent of arrows in a flowchart] *and post-it notes and things like that. They're much more used to sitting in a big meeting and discussing things.*"

"*They're not trained about groups and group dynamics, and they call that touchy-feely and are quite dismissive of it, but it's actually what makes the service work and it's what could hold them back from service development.*"

"*doctors are very wary of what they see as artificial interventions, so for example they will do workshop style work here, but they don't like it much and you have to be pretty loose as to the style you use and you have to watch what goes on and prepare to ditch what you had in mind if they don't like it because otherwise you're banging your head against a wall".*

Sources of advice

Assuming that the design community can provide tools and techniques that are acceptable to clinicians, dissemination

and diffusion is known to be a challenge in healthcare (25), and this study found that participants had no single common source of advice on healthcare design. Those who had trained in redesign techniques had received it from different sources and, while clinicians were aware of a variety of NHS advisory bodies, most didn't mention what is probably the main NHS source of improvement tools, the NHS III. In-house service improvement training was available for senior clinicians but there was talk of a long waiting list. An in-house service improvement team existed, using a variety of process redesign and change management techniques, but some managers said these were seen as outdated or unsuitable by many participants:

"They come into the room thinking, groan, here we go again, sticky paper and ... stick-its"

"I think people are bored to death of it. When we started about twelve years ago it was all new and people joined in. If you take, now, a room and do a workshop such as that … people won't come".

A variety of external management consultants, used for larger projects, disseminated their own techniques. However some participants felt they did not understand or deal adequately with complexity, and spoke of their "*arrogance*" and a lack of understanding of how things worked in the NHS:

"We do diagrams … we're aware of all the things you're saying but … I mean the point is, the health service, we're kind of really irritated by formal project people coming and telling us, it's easy, you just have to do this. Because we've been doing projects all our careers, you know, and to tell us well you don't know how to do a project is just, well no I just don't know how to do a project your way. You know, I've got a track record of results, what we do is we just argue with people until it's done, you know [laughs] … that's how we need to change things, persuade, beg, you know whatever it takes, then come along the project people, no no, you do it all this way, stop all that, do it all this way… what actually happens is you say, OK, we'll put it on paper your way. We'll carry on doing it our way, but we'll put it on paper your way".

Facilitators said their greatest success in eliciting requirements was through tailoring their techniques to the environment rather than imposing on it, relying heavily on interpersonal relationships, ad-hoc and opportunistic face-to-face communication, and "*corridor conversations*":

"*You have to do a lot of groundwork out in the organisation. Shadowing, shadowing, talking to them*".

The dissemination of techniques appeared to work in a similar way, through personal communication of experiences. Facilitators said the best results came when clinicians approached them to ask for help and advice after seeing colleagues benefiting from them. However, formal communication methods such as hospital newsletters rarely discussed design methods or advisors when mentioning successful projects.

Discussion

A summary of the main issues raised by participants can be found in Figure 2 (below).

Many of the barriers identified in the study are validated by existing literature. Issues relating to the political power of doctors and the manager/clinician divide (21, 22, 26-28), levels of complexity and change (16, 29-31), lack of suitable data (17-19), and difficulty agreeing values amongst different types of stakeholders (10) have been found in many healthcare organisations, and scepticism and resistance to organisational change is thought to be common across healthcare systems worldwide (20). The difficulty of engaging clinicians in quality improvement activities has been noted, as has their involvement being a critical success factor in successful project outcomes (32). Participants stated that every hospital is unique in terms of culture, practice and governance. Based on these views, we did not expect the outcome of this study to be fully generalisable; however the fact that many of its findings are reflected in existing literature would suggest that it may be applicable to other healthcare organisations.

Despite confirmation of many of our findings, the level of frustration, fear and antagonism expressed towards design techniques themselves was unexpected, particularly since anecdotal evidence had suggested a positive view of modelling and simulation by doctors. This is of particular significance given that it emanated mainly from senior clinicians who are seen as vital in the service improvement process. While it is clear than many of the barriers to healthcare service design are pragmatic and tangible, there appears to be an interplay between these and the emotional reaction to design methods, tools and terminology. Emotional acceptance of the use of service design methods may be impacted by:

- the tools and techniques themselves, e.g. not understanding how to use them, finding them unfit for purpose or not suited to their way of thinking, and the use of jargon and other unfamiliar terminology.
- a lack of understanding of the benefits of using certain methods and techniques, e.g. not realising that the purpose of using post-it notes to express views, rather than using verbal discussion, is to engage different senses and to allow everyone to have an equal say.
- negative connotations associated with the aims of design work, e.g. projects aimed at cost reduction, or standardised working, that may be thought to adversely impact patient benefit.
- the environment in which staff are being asked to carry out the work, where change and complexity can make effort seem pointless, and where the use of design methods and tools may have traditionally resulted in working through lunch, arriving home later or having less face-to-face contact with patients.

Fiol and Lyles describe organisational learning as "the process of improving actions through better knowledge and understanding" (33), and the design community needs to work with healthcare to understand the complex interplay

amongst and between the two types of barriers to effective design, in order to assist service improvement activities.

Figure 3 (below) shows pragmatic (organisational, process and stakeholder) and emotional barriers to design acting as filters to effective change. If the healthcare community can increase the permeability of any of the pragmatic filters, the permeability of the others, whether pragmatic or emotional, may also increase.

The design community also has a role to play; by increasing the permeability of emotional resistance to design methods and tools, the pragmatic barriers may weaken. Design studies tend to focus on the usability and utility of tools and techniques, such as Jun *et al*'s study of process modelling tools in an NHS hospital (34), but emotional acceptance is also an important consideration for the sustained use of design methods and tools. It is suggested that the two communities, design and healthcare, work together to a) clarify and communicate the problem of barriers to effective design, and b) test how the weakening of pragmatic barriers impacts emotional acceptance, and vice versa.

Limitations

Due to the diversity of staff engaged in service improvement activities, this study cannot adequately represent all views, and data saturation has not been achieved across all groups. Due to the emphasis placed by participants on the role of senior clinicians in service design, the next phase of this study will focus on collecting more data from this group to corroborate or challenge current theory on barriers to their use of effective design.

Conclusion

A number of pragmatic barriers to the effective use of design have been described. In addition, the issue of emotional acceptance of design methods and tools was identified. The complex interplay between these issues is not yet clearly understood.

User acceptance of design tools and techniques is as important as usability and utility, if design is to play an important role in healthcare service improvement. The external design community needs to be aware of their audience, of who the service designers are and what their values are, to ensure good design experience. Equally, the healthcare community needs to investigate whether factors under their control contribute to poor user acceptance of design. It is suggested the two communities continue to work together to investigate this issue further.

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The authors declare that they have no competing interests

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Figures and Tables

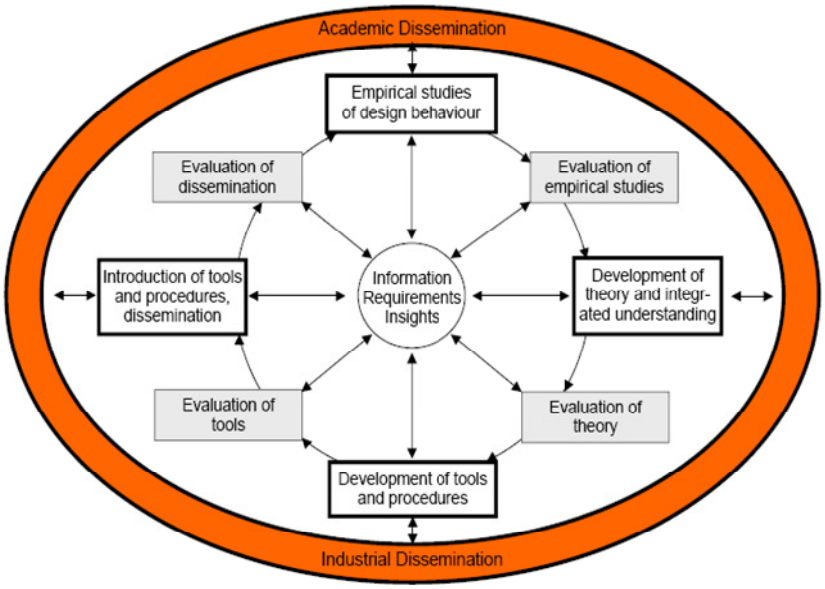

Figure 1: Eightfold Model of Design Research (13)

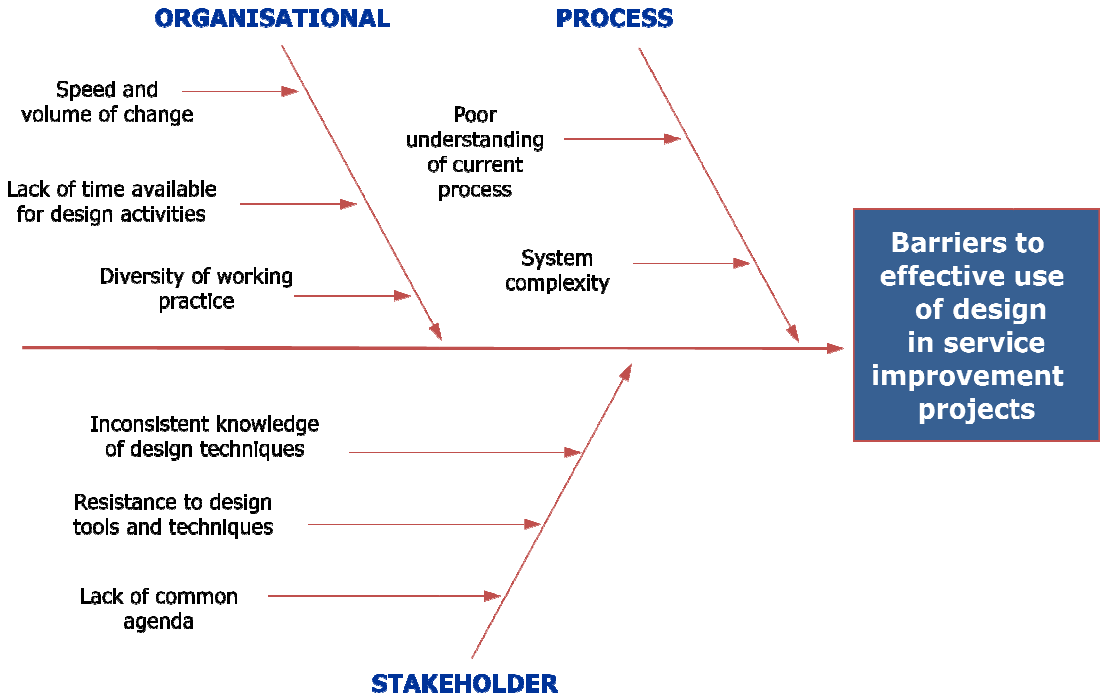

Figure 2: Summary of main issues raised by participants.

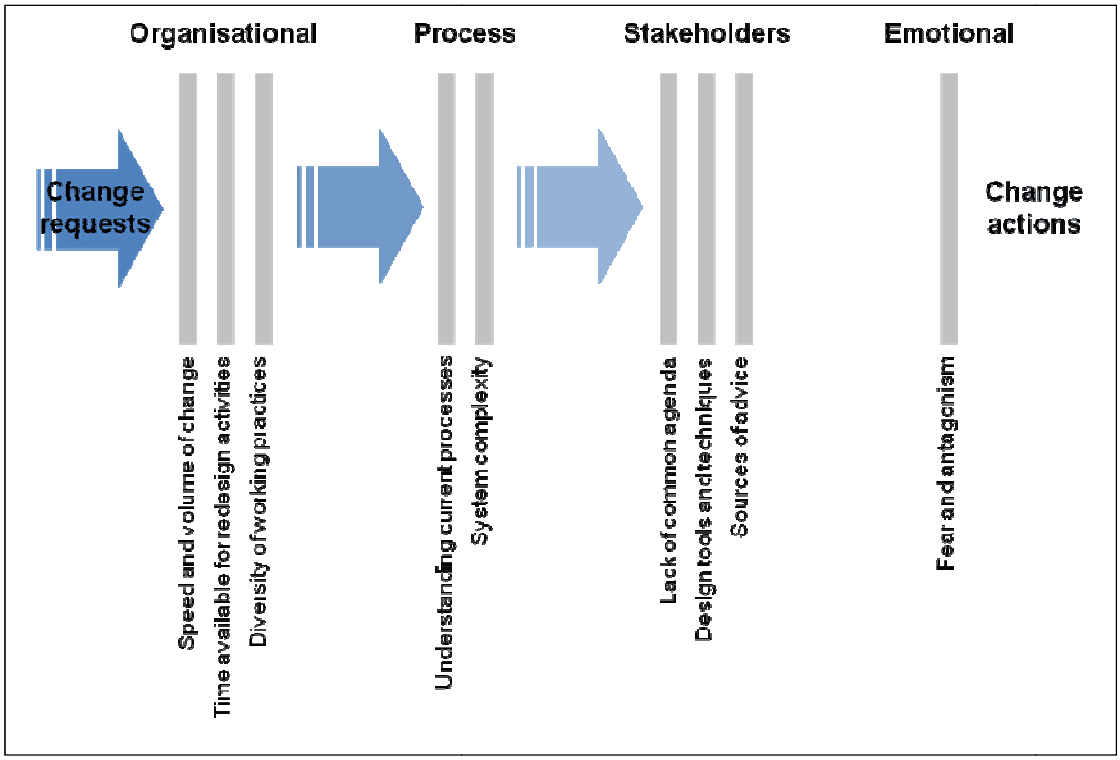

Figure 3: Filters reducing design effectiveness