

When infrastructure transition and work practice redesign collide

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Abstract

Purpose – As management innovations become more complex, infrastructure needs to change in order to accommodate new work practices. Different challenges are associated with work practice redesign and infrastructure change however; combining these presents a dual challenge and additional challenges associated with this interaction. The purpose of this paper is to ask: what are the challenges which arise from work practice redesign, infrastructure change and simultaneously attempting both in a single transformation?

Design/methodology/approach – The authors present a longitudinal study of three hospitals in three different countries (UK, USA and Canada) transforming both their infrastructure and work practices. Data consists of 155 ethnographic interviews complemented by 205 documents and 36 hours of observations collected over two phases for each case study.

Findings – This paper identifies that work practice redesign challenges the cognitive load of organizational members whilst infrastructure change challenges the project management and structure of the organization. Simultaneous transformation represents a disconnect between the two aspects of change resulting in a failure to understand the relationship between work and design.

Practical implications – These challenges suggest that organizations need to make a distinction between the two aspects of transformation and understand the unique tensions of simultaneously tackling these dual challenges. They must ensure that they have adequate skills and resources with which to build this distinction into their change planning.

Originality/value – This paper unpacks two different aspects of complex change and considers the neglected challenges associated with modern change management objectives.

Keywords: Transformation, Cognitive load, Organizational change, Work practices

Paper type: Research paper

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Transformational change represents a huge challenge for organizations (Kuntz and Gomes, 2012; Hosking, 2004; Price and van Dick, 2012). With those which involve organizational and infrastructure transformation found to create psychological strain in employees due to high levels of uncertainty (Bordia et al., 2004; Dobers and Soderholm, 2009), and the redesign of working processes leading to burnout, emotional exhaustion and loss of identity (Dopson et al., 2008; Price and van Dick, 2012; Kira et al., 2012; Rooney et al., 2010). Literature aimed at identifying simple generic solutions may no longer be applicable in situations where complex change initiatives combine many different elements of physical, organizational and social change (Dobers and Soderholm, 2009; Swanson et al., 2012).

Such changes are characteristics of healthcare across the developed world. Healthcare providers are facing funding cuts at a time of rising demand, against a backdrop of technological innovation (Lehner, 1998; Swanson et al., 2012). Health services are being redesigned around new models of care and as a result the role of hospitals is evolving. Some are closing as services are transformed and consolidated, while others are being substantially remodelled, demolished or rebuilt. Increasing patient expectations, coupled with rising concerns over the control of hospital acquired infections, have prompted a preference for individual bedrooms in hospitals, replacing traditional multi-bedded wards. In the UK, this forms part of official government hospital design policy.

We set out to unravel the challenges of such initiatives, drawing on case studies of hospitals which specifically encompass both infrastructure transition – a change in the physical working environment which requires organizational members to adapt their behaviour to new surroundings (e.g. a new building) – and work practice redesign, where organizational members' actions and operating processes are significantly changed. Studies

of large-scale hospital transformation are few but previous authors have suggested the need to consider a number of dimensions of change. These include whether the level of transformation is the organization or the industry, whether it is incremental or radical, and whether it is instigated by top-down or bottom-up drivers (Ferlie and Shortell, 2001). However, absent from this literature is adequate consideration of exactly what is being transformed and how complexity of the change initiative itself impacts on the organization's members (Kuntz and Gomes, 2012; Price and van Dick, 2012). To our knowledge there are no studies directly addressing the dual challenge of infrastructure and work practice redesign. In this paper we attempt to fill this gap by reporting findings from three case studies in the UK, USA and Canada. We ask, what are the unique challenges which arise from work practice redesign, infrastructure transition and when both simultaneously occur.

Transformational change

Transformational change is said to have taken place if the change is across the whole system; is multi-layered; power relations are reconfigured; a new culture, ideology, organizational meaning and new organizational form is created (Kuntz and Gomes, 2012; Ashburner et al., 1996; Ferlie et al., 1996). Transformation also requires the complete breakdown of old ideas and replacement with a new organizational archetype (Greenwood and Hinings, 1988). Transformational changes alter the basic character of the organization, how it is structured, how it relates to its external environment and how its members perceive, think and behave in relation to work and to the world (Anderson and Ackerman-Anderson, 2001; Cummings and Worley, 2008; Price and van Dick, 2012; Arya, 2012).

In healthcare specifically, organizational and healthcare system transformation have been the subject of much research (Dopson et al., 2008; Ferlie et al., 2003; Swanson et al., 2012) but are often criticized as not realizing their potential and achieving “real”

transformation (Ferlie et al., 1996). Government policies and the use of targeted interventions have been criticized for not taking account of system dynamics or seeing the “bigger picture” of change within the organization (Swanson et al., 2012; Dattee and Barlow, 2010). There is a call for change interventions and research which takes into account the collaboration of different groups within change management and to view different aspects of change as they interact with each other (Swanson et al., 2012). Here we make a distinction between infrastructure transition, a change in the physical working environment; and work practice redesign, where operating processes change.

When infrastructure transition and work practice redesign collide

Many initiatives in healthcare involve the introduction of a new service model or way of working, or an innovation which alters the way in which services are carried out. Work practice redesign projects often focus on re-engineering current processes, critically examining them and eliminating duplication, potential delays or error. Work practice redesign presents challenges in changing micro work practices (e.g. routine tasks and procedures) staffing and retraining, culture change and administrative or information technology adjustments (Dopson et al., 2008). Often these changes will impact on employee identity with the work or the organization (Rooney et al., 2010; Kira et al., 2012). For example, all-single bedroom configurations may present a whole new working model to a hospital moving from ward systems (where nursing stations are in full view of an array of patient beds) to decentralized nursing structures (where nurses use satellite nursing stations to be closer to the patients). The adaptation and success of new work practices may be influenced by the perception of values and ideologies which underpin new work practices (Rooney et al., 2010). For example, Kira et al. (2012) found that new practices were more

likely to be accepted if they helped employees to realize their own values and beliefs about the work which they do.

Organizational routines are the primary means of organizations accomplishing much of what they do, which means that changing these routines is an essential part of any organizational transformation (Chen et al., 2013). Routines build up over many years and are difficult to change. For example single occupancy rooms present challenges including different relationships with co-workers and patients, changed perceptions of visibility, increased by-the-bed patient care interactions, altered resource allocation and different communication techniques (Mooney, 2008; Young and Yarandipour, 2007; Ulrich et al., 2008). The management, refinement and feedback from changing routines is argued to be the most time consuming but often neglected aspect of transformational change (Chen et al., 2013).

Despite conflicting evidence of the benefits for employees and patients (Ulrich et al., 2008; Young and Yarandipour, 2007), single occupancy room models are increasingly seen as the norm for hospitals. Transformation to this care model remains an under-researched area. This is potentially problematic for hospital organizations and governments wishing to promote single room hospital care, given the complexity and magnitude of such a transformation. Inappropriate or insufficient strategic planning, availability and access to resources, organizational culture, burnout and emotional exhaustion are all acknowledged to be obstacles to the implementation of major work practice redesign (Tucker et al., 2013a).

Old hospital buildings are often unable to accommodate modern service and technological innovations, and moving to an all-single bedroom model is generally impossible (Dattee and Barlow, 2010). A US study found that building replacement hospital facilities involves a host of challenges in planning, strategy building and engagement (Hosking, 2004), with construction issues, redesign of care pathways, uncertainty

management and media and political attention all likely to need consideration (Bordia et al., 2004; Dobers and Soderholm, 2009; Dattee and Barlow, 2010; Swanson et al., 2012). It is reasonable to assume that implementing both major work practice redesign and infrastructure change simultaneously at the same time throws up an even more complex and unique set of challenges.

Therefore in this study we will examine the impact of combining two elements of organizational transformation simultaneously, namely the infrastructure and work practice design.

Study context

We adopted a comparative case study approach as this can offer increased external validity and can create more generalizable forms of knowledge (Yin, 2009). We were assisted in a worldwide search for suitable case studies by the Centre for Health Design's Pebble Project, an evidence-based programme for innovation in new healthcare facilities. We were interested in change projects in countries with highly developed healthcare systems but we wanted to compare case studies in different healthcare contexts to give a more generalizable perspective on the challenges faced across these contexts. In the UK, healthcare operates predominantly in the public sector, with state run health services providing a context where resources are tightly controlled and political influence is high (Dattee and Barlow, 2010). In the USA, a more market-orientated healthcare environment operates, creating a climate of competition between healthcare providers (Ferlie and Shortell, 2001). Finally, in Canada, healthcare is predominantly state-provided but different finance arrangements allowing a closer relationship with private partners in the running of the hospital facilities was developing (in our case study particularly), we therefore selected case studies from these three different contexts with the intention of identifying similarities in challenges which appeared in all

three organizational contexts (Ferlie and Shortell, 2001). Despite these differences in the wider contextual environment, we wanted to make the change projects and organizations themselves as similar as possible in order to ensure validity of the comparison.

The three selected cases all involved projects to replace an older hospital, with multi-bed wards, with a new hospital with an all-single room configuration. Each hospital was approximately the same size (300-500 beds) and was undertaking the change within approximately the same timeframe, to co-ordinate data collection. In each case the old hospital buildings were either demolished or converted to uses which were not direct healthcare provision, e.g. conference or teaching rooms. This marked a clear distinction between the previous hospital and the new building.

Each of our case studies approached the organizational transformation challenges in different ways. These are described below but are also summarized in Table 1. Our case studies have been given pseudonyms to protect their identity. These bear no resemblance to their location or identity.

Tutbury was the first UK National Health Service all single bedroom hospital. The project involved a rebuild of two older hospitals and reconfiguration of services within the local NHS Trust. This was prompted by government policy, which emphasized single bedroom accommodation, a need to replace an outdated district hospital and a serious infection control crisis a few years previously which had led to the deaths of elderly patients. The rebuild replaced two old sites (91 beds and 281 beds) with a new facility (512 beds), which opened over two phases in January and September 2011. The transformation involved moving from a mixture of four to six bed bays and some larger “Nightingale” wards up to 22 beds to an all single-room configuration. The new facility was funded under the Private Finance Initiative (PFI), a public-private financing partnership embracing banks, the construction and facilities management companies and the NHS Trust.

Table 1 – Case study change management approaches comparison

New employees were recruited to manage the organizational transformation. Experienced individuals at both board level and project level were hired, including a completely new executive team following the high profile infection scandal and removal of a majority of the existing board. Alongside the new board the PFI team was established, with representatives from partners.

A project office was created to handle the infrastructure aspects of the change. In response to a perceived lack of engagement from clinical divisions, links between the project team and the division were created 18 months prior to the transformation.

Four “project managers” were recruited to translate operational procedures arising from the hospital design to the clinical divisions which would be working in the new facility. They were positioned between the project office, who were managing the build, and the four divisions within the Trust. Their main tasks involved filtering and translating communications between groups and facilitating dialogue between relevant groups. The organization adopted a “cascade model” of information dissemination, using the existing clinical division structure and existing communication pathways to disseminate information about the change programme to staff. The four project managers were heavily relied on to communicate messages throughout the formal organizational hierarchy so the effectiveness of the selected individuals was essential.

Arlington was the rebuild of one of several hospitals within a private US healthcare organization. The hospital has a special focus on women and children’s services and operates in a competitive local healthcare market. The rebuild was on a new greenfield site, the transformation involved moving from a 396 bed hospital of mostly semi-private (two-bed)

rooms or bays, to a new 368 bed 100 per cent single bedroom configured hospital. The move took place in May 2011. The organization operates on a non-profit basis and financed the new facility internally.

At this organization there was a special focus on process improvement and creation of a culture of organizational readiness to minimize the impact of changes associated with the transformation. The new hospital formed part of its longer programme to re-engineer its business processes using tools such as Six Sigma, Lean and Change Acceleration Processes.

Arlington used specially trained process improvement experts scattered throughout the organization. They used skills in process redesign to facilitate changes in work practices at a local level, using smaller operational projects which would be incorporated into the larger overall new design. For example, throughout the planning of the transformation project a “Six Sigma Black Belt” would temporarily join a department or work team and carry out a series of process improvement exercises at the unit level encouraging organizational members to think about the new hospital environment and the way they would provide care within it and how this would impact on the organization as a whole system. This involved dismantling processes, removing ineffective tasks and redesigning each process to optimize patient safety, efficiency and cost effectiveness. Where possible these new processes would be piloted and/or put in place before the transformation under the supervision of the facilitator, who would then move onto another group within the organization.

Maple, a Canadian public sector hospital, embarked on a project to build a new patient tower, to accompany a diagnostics and treatment centre completed several years ago. This replaced out-of-date inpatient facilities (612 beds, mainly in four to six bed bays). The move took place in March 2011. The new facility was built on a brownfield site (500 beds – 83 per cent single room configuration) and was funded under a public private financing

partnership similar to that of Tutbury although the private partner would have more involvement in the operation of some services in the facility after it was built.

At this organization, a dedicated project team absorbed most of the burden of the change management including both infrastructure and work practice redesign issues. This team also took on responsibility for the engagement and training of front line staff, circumventing operational level general managers. The project office was detached from the organization's main structure. This way, it was felt that the workload of operational middle management staff, traditionally burdened by change implementation (Balogun and Johnson, 2004), would be relieved and a direct link with frontline staff created.

The members of the project team were selected according to their transferable project management and change management skills – and encouraged to develop these further – as part of a long-term strategy for implementing future projects by the organization. Once the project team was disbanded and moved onto their next project, the new building and service design became the responsibility of existing operational middle managers.

Data collection

Two researchers visited the three study sites at least three times, immersing themselves in the organizations day-to-day activities. Data comprises 155 interviews, 205 documents (including internal documents, publicly available reports and research, and media coverage) and field notes from 36 hours of observations (including new and old hospitals tours, informal research observations and impressions, formal mock up days and meeting observations) (see Table II). Data were collected by the research team over two phases for each case study. By using a variety of data sources we were able to gain a holistic picture of the case study and its context from a variety of perspectives (Yin, 2009).

Initial interview participants were selected with the help of a lead contact within each organization. To ensure that we were able to identify challenges which effected members of the organization at all levels we selected individuals from three different organizational levels. These included key members of senior management (who made strategic decisions about the reconfiguration), middle managers (who were predominantly responsible for the implementation) and frontline staff (who enacted the new practices and worked in the new hospital). All three of these levels of organizational members have been found to have a crucial role in organizational change management (Balogun and Johnson, 2004; Birken et al., 2012; Parry, 2003; Bolton, 2005).

Table 2 – Data Collection

Interviews were semi-structured. The researchers used an interview protocol to ask the same key questions to all participants, however, further elaboration, prompts and follow-up questions were used on an individual basis to probe more deeply into relevant topics. On some occasions participants were asked for examples to illustrate their opinions and aid the researchers understanding, or were asked to explain procedures or events which helped to contextualize the themes. In phase I our focus was on the strategic aims of the reconfiguration, business models used, drivers and historical context. For example, participants were asked “In your opinion, what are the main aims and objectives of the project?” In phase II (approximately three months after the reconfiguration) our focus was on the immediate impact of the reconfiguration and evaluation of this. For example, participants were asked “How do you think the move went?” as well as more specifically about the challenges faced and the learning gained, for example, “what were the main challenges which the organization faced?” and “what do you think the organization has learnt during this

experience?” The interviews were conducted by two researchers and analysed by three researchers, providing an opportunity to cross check impressions and interpretations. A report and presentation were fed back to the organization reporting our interpretations of the data and the organization was in broad agreement with our findings¹.

Data analysis

Data were stored and managed using NVivo software for qualitative data. The coding and synthesis of the findings was undertaken by hand by the research team. Interviews were transcribed and analysed at different levels allowing for constant comparison between the data and the findings (Corbin and Strauss, 2008). Initially, an historical context of each case study was derived. At the first coding stage we used an open coding approach to identify concepts relating to strategies, attitudes and beliefs about organizational planning and impact. These open codes were then compared for similarities and differences to create conceptually similar groupings. We then created more distinct higher order categories addressing the types of challenges which the organizations faced, which we compared to the original transcripts for verification (Corbin and Strauss, 2008). These categories were summarized in relation to our theoretical framing and are presented in this paper. At each stage of the analysis, members of the research team met to discuss interpretations of the findings, compared analysis and discussed any inconsistencies. There was broad agreement in our interpretations throughout the process and any inconsistencies were addressed by referring back to the original transcripts.

Findings

We performed a comparative analysis of the change management techniques and approaches used by each of our case studies. All our case studies handled the transformation

in different ways (as described above) but all experienced common challenges which were observed across all sites. Our analysis of the data identified different challenges which arise from work practice redesign, infrastructure transition and when both simultaneously occur. These different challenges were encountered in all three cases, below.

Cognitive overload – the stressors of work practice redesign

Work practice redesign requires employees to change the practices they have been accustomed to and replace these with new practices, which need to be learnt and cognitively attended to until automatic processing makes them routinized and manageable (Dopson et al., 2008). For example, single room working requires all practices to be adapted so that nurses can remain in patient rooms for longer, spending less time in corridors, at the nursing station or in other places visible to other healthcare professionals and members of the public. Employees were also learning how to use new technologies (all three case studies) and work within new teams or clinical specialties (predominantly Tutbury and Maple). We found that employees at all levels found it difficult to absorb all the new information both in terms of cognitive capacity and coping mechanisms:

I think all staff found it challenging just to absorb all that information [...] we seemed to have new procedures coming out of our ears [...] quite a lot of it just went in one ear and out of the other [...] my brain was just full (Arlington, manager).

Some of them just didn't have the capacity to take in all the information we were giving them [...] they were getting overwhelmed by it [...] just overwhelmed and confused (Maple, senior manager).

Despite all three cases creating new roles specifically dedicated to the work practice redesign (project managers at Tutbury, process improvement experts at Arlington and the project office at Maple), employees reported excessive stress, confusion and exhaustion due to the scale and complexity of the information processing required:

So at the outset they're overwhelmed, absolutely overwhelmed getting their head around the complexity of it (Tutbury, manager).

It was very stressful trying to process all the new [procedures] [...] Every night I would go home exhausted, not because the job was physically hard, like when I was nursing, but because it was so much information to process (Arlington, change specialist).

In each of our case studies one of the aims in moving to a majority single-room design was to avoid numerous patient transfers around the hospital as their care needs changed. To make this possible all three cases sought a standardized design, so that any inpatient room could be easily adapted to suit all levels of patient need. Therefore, work practice redesign needed to be organization-wide to ensure the co-ordination of changes and standardization of operating procedures and patient pathways. This approach also allowed employees to move around the hospital without having to relearn practices on different wards:

It has been difficult, coordinating [changes as we go along] and consolidating it [with] how our patient pathways were changing. Does it all still hang together as a cohesive whole? (Tutbury, manager).

However, the pace and duration of change posed problems. In all cases issues of change fatigue were identified:

There has been so much change lately; it's just one thing after another (Tutbury, manager).

Just when you think you are done, you get told another process needs to change [...] and then another thing comes along [...] (Arlington, nurse manager).

For example, at Maple the work practice redesign involved new processes associated with implementation of an electronic medical records system, which was introduced over a series of stages. This led to a prolonged period of constant change and upheaval, with staff having insufficient time to readjust before the next change came in:

[...] the quickness of it was just maybe too much, because it just felt like it was like go here quickly, look at this, then change again, we can only take in so much [...] and then on top of it you have an environmental [building facilities] change [...] We're just doing it all together (Maple, nurse).

Lack of time to embed new ideas created chaos and confusion in the immediate post-move period, especially in instances where automatic processing of certain tasks was performed by staff. In the immediate aftermath of the move, each task in the normal working day required attention to ensure that the new procedures arising from the move were followed. At Maple it was reported that employees were forgetting basic training and missing

steps of a usually routine processes, because they were overwhelmed with conflicting information:

There was the first few emergency situations where people would forget to do what their new training was [...] they would forget some of those steps [...] they let the change overwhelm them and they were forgetting the basics (Maple, project team).

Doing [name of procedure] used to be easy [...] I could do it in my sleep [...] but now I have to think [...] where do I get [name of equipment] [...] who am I supposed to report that to? [...] what am I supposed to do with this [report]? [...] I have to check myself at every step (Maple, nurse manager).

The individuals who experienced the most stress and overload were different across the cases. At Tutbury, project managers who acted as a communications filter, in being charged with interpreting the strategy and implementation plans from multiple parties, were the most at risk:

They [project managers] had a really difficult job, they were pulled both ways [between the project office and the clinical divisions] [...] everyone just kept loading them up with more tasks (Tutbury, senior manager).

At Arlington, by not having a project office separate from the existing site management team it was senior managers who were managing both the ongoing operation on the existing hospital and the new build simultaneously:

[Member of site management team] was an absolute star [...] he did everything [...] and he did it all at once [...] he had to really [...] it must have been really hard
(Arlington, senior manager).

At Maple the burden of information overload changed throughout the project. In the early stages the project office took on a majority of the implementation and translating of information but this changed to the operational middle managers in the months following the change. These not only had continuing problems to resolve, but also need to assimilate and understand the decision-making of the now defunct project office staff:

Yeah, it was the [project office] that did all that [...] they took all that on [...] they made the decisions and saw it through (Maple, middle manager).

There was no one we could ask [about why something had been designed a specific way] [...] whenever there was a question I would have to go back through all the paperwork to find out the answer (Maple, middle manager).

Tensions between infrastructure and work practice redesign

The activities performed by managers charged with implementation of the work practice redesign were often ambiguous, with flexible deadlines and targets. In contrast, infrastructure-related tasks had tighter deadlines and structured processes often governed by contractual obligations. Where middle managers (Tutbury) were assigned responsibility for infrastructure tasks, they were able to draw on these structured processes and principles:

They [project team] produced very expansive charts that tried to tie it all together and that became a tool that we could then use (Tutbury – senior manager).

The biggest challenge associated with infrastructure tasks was sticking to deadlines; failing to do this created anxiety and uncertainty:

All of those tasks had really important deadline, an inspection, or [legal procedure] which dictated when we had to do it [...] there was a lot of pressure to meet those deadlines (Arlington, site team).

There was a lot of tension around those deadlines [inspections], if we didn't get it ready then we wouldn't be able to open [...] all the move plans would fail [...] we just couldn't afford to push anything back (Maple, project team).

For example, some managers expressed concerns that negotiations and debates around certain issues were becoming too prolonged, creating uncertainty amongst staff which hindered progression:

I think we've got to close down some of those [discussions], such as how the basic staffing levels are going to be. We just need to close it down, it's gone on for too long [...] and what people need now is a bit of certainty (Tutbury – manager).

The biggest challenge however, was where managers were attempting to perform a dual role, managing both work practice redesign and infrastructure tasks. This created internal conflict over which tasks to prioritize and how strictly to adhere to certain deadlines. For example at

Tutbury middle managers prioritized the operational aspects of their role relating to infrastructure (i.e. designing ward layouts and bed configurations) over the engagement aspects of the work practice redesign (i.e. explaining to employees the new care philosophies and motivating champions). Activities such as walking the wards and talking to staff were often sidelined or completely ignored:

It's been quite difficult because whichever way you cut it, the operational side has always overtaken other things (Tutbury, middle manager).

At Maple frontline staff criticized the extent and quality of onsite training and education around new technology in the new building, because information was rushed and incomplete. They argued that the training did not involve the correct equipment and was not interactive enough. Thus, there was conflict between understanding the potential of the physical infrastructure and its new technology, and understanding how it could actually be used within the new design:

I think they [education/training sessions] were actually quite useless. We had these [communication devices for use in the new hospital] [...] but it was like playing with little practice candy boxes that you're talking to a piece of plastic compared to what it was really going to be like. We had to go from station to station, literally three to five minutes in a station, and they would talk for most of it [...] and you had to move [...] It didn't at all prepare us for the way it was really going to be (Maple, nurse).

In cases where project managers or teams were undertaking both work practice changes and infrastructure tasks the consequences of these tensions included a disorganized approach to

planning – middle managers moved from task to task based on which had the most urgent deadline rather than with having real direction. At Arlington work practice changes were prioritized. As a result the infrastructure design was guided by the work practices which would be conducted within in.

Cognitive mapping and the differential relationship between redesign and infrastructure

One of the main benefits of simultaneously moving to new infrastructure and redesigning work practices is that processes which would not have been plausible in the previous infrastructure can be designed into the new facility from inception. However, employees needed to understand the reasons for design decisions. For example, at Maple, specialist areas were built into each ward space for physiotherapy and rehabilitation treatments. Previously these assessments had been carried out in patient bays or corridors, with heart patients having to demonstrate they could walk up a flight of stairs before their discharge from the hospital. The rationale behind the new design was that rehabilitation could be carried out in the new specialist areas, allowing new techniques with the latest equipment. However, for the first few months, employees continued to try to use previous treatment and assessment processes. Whilst the visualization of how the redesigned model and infrastructure worked together was clear for the senior management – frontline staff, who were still carrying out old processes until the morning of the move, struggled:

The main staff issues are about [how] we used to be able to do everything differently over there [the old facility] and we don't have the space to do it in the same way and it's not recognizing that we're trying to blow up what we did. It's like how can we do it in the space now the space is different? (Maple, manager).

They've given us these new [rehabilitation] rooms [...] I'm still not really sure what we're supposed to actually do in them (Maple, nurse manager – author's emphasis).

How am I supposed to walk my patients up and down the stairs [the old criteria for being discharged]? [...] they are all security alarmed now (Maple, nurse manager).

At Tutbury staff reported that it was only after they had moved into the building that they understood the extent to which they needed to change their operational processes:

I don't think they [the front line staff] every really grasped the level of day-to-day change that needed to happen [...] it was a big shock when we got there for a lot of people (Tutbury, senior manager).

During the initial period frontline staff and unit leaders made many adjustments to the ways they delivered care in the new environment:

We did think for the first few weeks that we were here that we would never settle down. We wouldn't be able to adapt to the way that we were working. And we were saying we need more nurses. But when we thought about it we didn't actually need more nurses, we needed to change. So we adapted the way we worked (Tutbury, team leader).

Another example at Maple explained how plans for a paperless system which would “future proof” the infrastructure were confusing for staff because the overall work practice design had not yet changed. The new infrastructure incorporated provisions for a fully

functioning electronic medical records system, where all patient notes would be kept in the patient's room instead of paper charts at the nursing station. The introduction of the new information technology systems was introduced in phases; for the first few months employees had to operate a hybrid system keeping both electronic and paper records. However, because employees could not understand how the fully functioning system would work or how the new practices would help them they reverted back to the old system. Instead of looking for solutions to problems with paper storage (created by not using the electronic system fully) they attempted to replicate old (now dysfunctional) practices in the new environment. Because the new environment was not designed to support the old practices, the employees blamed the new infrastructure for inhibiting their working practices:

[...] so even though we spent all this time on the units before, and talked it through the systems and had trained the way the units were set up [...] what we saw was that people were very quickly trying to replicate the old order in the new environment (Maple, project team).

In comparison, Arlington reported fewer instances of resistance to new practices. Most practices were piloted in advance and employees already understood how they fitted into the new environment. Instead employees were prepared to take on the new practices, despite them being suboptimal in the old hospital design, so it was seen as a relief to move to the new building. This was most clearly seen in the mother and baby unit where nurses simulated in advance of the move how they would deal with care differently in the new building:

[...] we did change our process for, after a baby's born, how we care for the mom and baby together, and we were able to simulate that at the other hospital. I think that was really a good thing, because it's just been accepted [...] They did a pilot there, but because they couldn't make the infrastructure changes, they couldn't really sustain it [...] but through simulation we were able to get people comfortable with it and it hasn't been that much of an issue here (Arlington, manager).

Discussion

This paper presents three case studies of organizational transformation where work practice redesign and major infrastructure changes occurred simultaneously. Our analysis found that work practice redesign challenges the cognitive load of organizational members, whilst the addition of infrastructure change challenges project management and implementation activities. Simultaneous change incorporating both these aspects of transformation initially resulted in a disconnect between the new physical infrastructure and working practices, leading to implementation failures of one or both of these change management processes. This has implications for change management planning, resource management and the adaptation and routinization of work practices for employees. We therefore discuss below some of the lessons learnt and what organizations can do to prevent this disconnect.

During the transformation we observed three different approaches in our organizations. Tutbury essentially adopted a problem-solving approach, identifying and responding to the myriad of events arising from the constantly changing NHS environment and modifying their plans accordingly. For example, they identified a disconnect between the project office and the clinical divisional teams and therefore created a project manager facilitation role to fill this gap. However, they attempted to use this role for both

infrastructure and work practice redesign tasks and this led to excessive cognitive loading of these agents. We observed how the level of cognitive information processing required of these organizational members became more challenging over time as the transformation approached and the workload mounted up. There was no clear plan for their role or boundaries limiting what tasks the project managers would undertake and therefore the role became larger and larger.

Whilst research on transformational change is calling for more system-based approaches and more integration of planning and resources (Swanson et al., 2012) an effective way to manage this still seems elusive. Research in cognitive psychology demonstrates how complex activities can overload the finite amount of working memory an individual possesses (Paas et al., 2004). Excessive cognitive load has been found to impair problem solving ability, memory and learning (Barrouillet et al., 2007). It has been demonstrated that organizational transformation requires extensive schema acquisition (the adoption of new mental structures of understanding) (Balogun and Johnson, 2004). This can be impaired when individuals are simultaneously occupied with other tasks. If elements of the transformation can be separated and taken on successively rather than simultaneously, cognitive overload will lessen (Sweller, 1994). Tutbury's experience suggests that transformation specific roles need to be clearly defined with adequate planning for the dual needs of work process redesign and infrastructure transition.

At Arlington, a highly proactive approach was taken, planning for as many work practice changes in advance. They worked hard to ensure that their decisions were well researched and tested. This approach appeared to reduce the upheaval of the initial post-transformation period. The difference between Arlington and the other two case studies, which reported a more turbulent post-change adjustment period, arguably results from the alignment between this hospital's transformation and its longer term programme of internal

culture change in the ten years prior to the hospital transformation. For Tutbury and Maple the transformation represented the beginnings of a new culture of providing care in a different way. Research suggests cultural changes associated with work practice redesign may take a number of years (Cameron and Quinn, 2006) and that consistency between the organization's vision and explanations of the transformation are important for building trust and creating commitment to change (Tucker et al., 2013b). Also related to this is the notion that the changes at Arlington were viewed as an extension of already changing values and beliefs within the organization. Kira et al. (2012) found that the adaptation and success of new work practices was influenced by the extent to which new practices make it possible for employees to realize their values and beliefs about work and our study would confirm this. Specifically, this case study highlighted the importance of having alignment between the formal changes which were taking places (i.e. to the environment and structure) as well as in the hearts and minds of employees (Arya, 2012) who were able to routinize the new practices easier due to this alignment.

Important in achieving this in Arlington was the linkage between the unit level process improvement interventions and the system-wide approach to change management which was supported by the use of intensive training and development of key organizational members who acted as facilitators. In literature on managing organizational transformation in healthcare, Ferlie and Shortell (2001) propose a multilevel approach to managing transformation which identifies four levels of challenge (individual, microsystems, overall organization and system level). They argue that effective transformation needs to consider the interdependencies of these various levels and how they interact. This research highlights the importance of having an organized proactive approach to accomplishing this. However, despite the efforts at Arlington to integrate unit-and system-level change activity, in the planning stages key organizational members still experienced cognitive overload where they

attempted to adopt redesigned processes in the old (unsuitable) hospital which presented a limitation on the extent to which their strategy could be fully enacted.

At Maple, a fully integrated approach which used a dedicated group of staff to combine both the infrastructure and work practice aspects of the hospital redesign enabled a highly consistent strategy across the organization. This approach was much more iterative, with key decision makers building on layers of complexity as they planned for and executed the transformation. The lesson here is the need to continue to adopt an iterative process in the post-transition phase. Stressors and tensions arose during the post-transition period when operational managers who took over from the project team attempted to change work process without any background knowledge of the underlying drivers for the transformation. This led to high levels of uncertainty which increased the psychological strain of the adjustment for employees (Bordia et al., 2004). Individuals respond to change in different ways and this creates misalignment between interpretations of the change. Kira et al. (2012) write that work practices can become meaningless if they no longer correspond to the employee's identity which leads to cognitive dissonance. As a result employees may distance themselves from aspects of the work which they do not understand or which does not align with their identity which can lead to a loss of engagement (Bolton, 2005). This research highlights the need for continuity of decision makers throughout the change process as a means to reduce the misalignment and correct misinterpretations by giving feedback on new routines (Chen et al., 2013).

We found that three to five months after the transformations all three of our case studies reported that a majority of employees had adjusted to the new infrastructure, but the work practice redesign aspects were still challenging especially at Maple, due to this lack of adjustment and context specific knowledge. The retention of change-specific knowledge and understanding the rationale for past decisions is key to ensuring that future decisions

regarding the modification of work practices posttransition continue to support overall organizational strategy.

Conclusions

This paper makes a contribution to the study of change management and work redesign by drawing attention to the distinctive challenges of infrastructure transition, work practice redesign and change that incorporates both. We highlight three key issues which practitioners of change management should consider where they face a change which incorporates both infrastructure and work practice redesign simultaneously. First, serious planning needs to be done regarding the use of change specific roles (e.g. change agents, champions, liaison position). What are the boundaries of this role and is it feasible for one individual to take on all aspects of the change? If not, then how will multiple roles integrate to ensure the effective management of both dimensions of the change. Second, there is a need for a clear vision and alignment of goals for all aspects of the change. Consideration needs to be given about how multi-faceted change can be considered more holistically rather than in numerous parts. Finally, we highlight the need for continuity of knowledge about this vision and how different aspects of the change fit together. Decision makers during the change process need to be available throughout the process to answer questions and an effective handover needs to be arranged if they are to move on to other things.

Although much research has been conducted on hospital transformation and highlighted the need to consider issues of complexity (Kuntz and Gomes, 2012; Dattee and Barlow, 2010), much of this work fails to demonstrate how various aspects of complexity interact. Overall, research on organizational transformation in qualitative empirical work provides a rather narrow lens which neglects the processes involved in highly complex reconfiguration. We would urge future authors of papers addressing organizational

transformation challenges to apply a wider lens that pays attention to the interconnectedness between the different types of change and the unique challenges these junctions represent.

In sum, our findings suggest that organizations need to carefully distinguish between the different challenges of work practice redesign, infrastructure transition and when both simultaneously occur. Where change is intense and prolonged staff are in danger of mental exhaustion. Organizations need to consider not only appropriate allocation of human and material resources, but also ensure that they have a clear understanding of the challenges and structures in place to manage the dangers of exhaustion. Our research hopefully goes some way in building this understanding, and so ensuring these dangers may be mitigated.

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Table 1 – Case study change management approaches comparison

	Tutbury	Arlington	Maple
Primary drivers of change	Increase acute care Modernisation of old facilities Infection control Reconfiguration of service provision across the Trust	Demographic changes (growth in demand for women & children services) Introduction of new technology Process improvement	Demographic growth (65+ population) Staff retention Energy efficiency Modernisation of old facilities.
External context	Community and political resistance to reconfiguration of some services. High profile subject to media scrutiny, partly due to earlier infection control scandal	Competitive healthcare market, other local providers in direct competition. Engaging local media as marketing strategy	Generally supportive but subject to media scrutiny
Additional changes and complexities	Service reconfiguration across the area served by the Trust to focus on acute services in one place.	Introduction of new electronic medical records systems 3 months prior to opening new hospital Forms part of an organisation-wide process improvement programme	Incremental introduction of new electronic medical records system before, during and after opening of new facility
Training and education	Change management and leadership training for middle and senior managers across the whole trust. Orientation and basic training for all staff	Continuing process improvement training for selected individuals to become Six Sigma agents Management engineers organised 'Move day' drills and simulations Orientation and basic training programme for all staff	External consultant sought to advise on training and education programme. Hands on (in building) training for all front line staff
Timescale of move from old facilities	Two-phased move into new building over period of 9 months	Single 'move day' for all services	One phase of move in one days but incremental technology implementation afterwards
Use of human resources	Development team created to manage the design, construction and finance Project managers seconded from each clinical division to lead implementation	Core site team comprising existing management team for the part of the organisation moving to the new facility Facilitator- six sigma agents (trained in process improvement) and management engineers leading change implementation with the core site team	Project management team created external to existing organisational structure

Table 2 – Data Collection

Data Source	Tutbury		Arlington		Maple	
	Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2
Formal Interviews:						
Senior managers	9	11	13	2	10	5
Middle managers	12	21	10	7	11	13
Frontline staff	1	10	5	5	3	7
<i>Total</i>	22	42	28	14	24	25
Observations (hrs):						
Hospital tours	2	1	2	2	1	1
Informal observation (public areas)	2	4	2	2	3	2
Formal observation (meetings, events)	3	3	6	-	-	-
<i>Total</i>	7	8	10	4	4	3
Documents:						
Internal documents	12	4	16	-	4	6
Government/National docs/Published	1	-	1	-	-	-
Media	33	57	18	17	2	12
External parties (e.g. campaigns)	3	-	-	-	-	-
Impressions/case notes	4	2	6	-	4	3
<i>Total</i>	53	63	41	17	10	21

¹ Individual transcripts were not returned to participants, however, a short summary report was provided to all those who took part with contact details of the researchers for any participants with follow comments or concerns.