



Research article

# Local sociotechnical system development in the NHS National Programme for Information Technology

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## Abstract

The National Programme for Information Technology is implementing standard electronic healthcare systems across the National Health Service Trusts in England. This paper reports the responses of the Trusts and their healthcare teams to the applications in the programme as they are being implemented. It concludes that, on the basis of the data available, it is likely that the emergent behaviour of healthcare staff will serve to minimise the impact of the systems. The paper looks at the opportunities within the programme to undertake local sociotechnical system design to help staff exploit the opportunities of the new electronic systems. It concludes that there are opportunities and offers one case study example in a Mental Health Trust. However, it concludes that there are many aspects of the technical systems themselves and also of the approach to implementation, that limit the opportunities for local sociotechnical systems design work.

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## Background: Technology first in sociotechnical systems design

This paper reflects on the NHS (National Health Service) National Programme for Information Technology from the perspective of sociotechnical systems theory. The initial studies that led to the creation of sociotechnical systems theory at the Tavistock Institute of Human Relations in the 1950s were concerned with the impact of mechanised systems on the existing work organisation. Trist *et al.* (1963), for example, were concerned with the impact of longwall coal mining, with its system of mechanical coal cutting and conveyor belts, on the roles and team organisation of miners. Rice (1958) studied the introduction of mechanically driven looms in weaving sheds in Ahmedabad in India and the fragmentation of work roles that resulted. In both cases, the authors took the technology as given and explored the organisational choices that were available to ensure an effective sociotechnical system resulted. In the intervening years, the focus of sociotechnical work has shifted to the simultaneous exploration and design of both the technical and the social

subsystems, a recognition that there are technical as well as social system alternatives. The opportunity to explore the options in both domains is seen as giving much more potential for the development of a working sociotechnical system that is closely geared to the demands of the primary task in its particular context.

However, the theoretical argument for the design of social and technical systems in their local context has had little impact on the application of large-scale information technology systems in organisations. It is increasingly the case that IT suppliers offer 'enterprise' systems that incorporate a range of information storage and processing facilities to support the business functions of organisations. The technical system comes pre-defined. Any company that implements these applications finds that there are implications for their business processes and for their work organisation. However, this does not mean that the technical system is implemented and used as provided. There are now many studies that document the way in which the staff of an organisation respond to these applications. Pinch and Biker (1987), for example, use the

term 'social construction of technology' to discuss the way the technology is interpreted and used in local settings. Similarly, Orlikowski (2000) shows how users have 'a practice lens' through which they determine how they will use technical systems in the work they do. Abdelnour-Nocera (2005) studied the use of an enterprise resource planning (ERP) system in companies in different countries and provides many examples of different patterns of use emerging from the use of the same technical system. All of these studies point to the active way in which local organisations respond to technological implementations to adopt and adapt them to local circumstances. While these responses show local action, the results are often piecemeal and covert and may not lead to an effective local sociotechnical system.

The National Health Service National Programme for IT (NPfIT) is a massive example of a similar attempt to implement pre-defined technical systems into existing organisations. The suppliers who have been commissioned to deliver the NPfIT applications are, in the case of national applications, expected to deliver the same systems throughout the NHS in England. In the case of the five geographic clusters, the suppliers are expected to deliver a similar suite of electronic healthcare record systems to all the NHS Trusts in their cluster.

Within each Trust there are many healthcare teams delivering patient care on a daily basis. They can be considered as existing sociotechnical systems with their own social systems deploying existing technical resources to accomplish their primary task of patient care. These sociotechnical systems have developed in the context of a very wide array of medical tasks, from general practitioners (GPs) to many different medical specialties. They have different histories and operate in different local circumstances. The primary objective of the National Programme is to create electronic patient records that can be exchanged across Trust boundaries and standard technical systems are seen to be the way to accomplish this. As a result, Trusts cannot choose information technology systems to suit their circumstances but are expected to adopt common solutions. NPfIT is therefore delivering standard solutions into large numbers of existing sociotechnical work systems that will show huge diversity. How the matching of the standard system to specific local circumstances will be undertaken is a vital issue for the programme.

One possibility is that the technical systems will contain sufficient flexibility for them to be customised to suit local needs. In formulating his principles of sociotechnical systems design, Cherns (1976, 1987) included a principle of incompleteness and a principle of minimum critical specification. These principles emphasise the need to create both technical and social systems that can be locally customised and developed in order that local stakeholders can cope with the specific and changing requirements of their working context. Many modern technical systems offer an array of facilities that can be customised for local use and it is possible that the NPfIT applications will have sufficient flexibility for this purpose. However, there will then be a need for a local design process to exploit the potential of the technology in a way that is appropriate for local needs.

Fairley (2005) has characterised the NPfIT programme as a 'push' strategy; thrusting new technology into the healthcare practices of the NHS and this does not suggest much room for local design. On the basis of the previous research results we might predict that if there is no local design, many users will respond by limiting the impact of this 'push' so that it does not damage local methods of delivering healthcare. I have suggested elsewhere (Eason, 2005) that there is a need to explore whether it is possible to turn the 'push' into a 'pull' strategy; whether there is scope within the implementation process to create a local sociotechnical design process. This paper is an examination of the opportunity to do this; is it possible to have a centralised information technology programme and local sociotechnical design?

The purpose of this paper then is to review early evidence of the impact of NPfIT applications on NHS Trusts to answer three questions:-

- (a) How are the staff of NHS Trusts responding to these new technology systems?
- (b) Do these responses constitute an effective way of creating new sociotechnical systems that utilise the potential of the new technical resources?
- (c) If not, what can be done locally in the implementation process to promote effective sociotechnical systems design?

### Methodological considerations

The NPfIT programme is in the first few years of a 10-year roll out of a range of IT applications. The impact of the applications on NHS Trusts is only gradually becoming apparent. There has been no substantive or comprehensive evaluation of the impact but case study data is emerging in a somewhat piecemeal fashion. The programme has received massive media attention and, as a result, there is a considerable volume of anecdotal evidence of the impact of the applications.

The Bayswater Institute has undertaken action research studies in the NHS in relation to several previous generations of information technology applications (Klein, 2001) and this work has continued in relation to NPfIT. We have had the opportunity to work with a Mental Health NHS Trust on its strategy to implement NPfIT applications and we have interviewed health informatics staff from a range of Trusts about their early experiences of the implementation of the NPfIT programme.

Many of the applications that are part of the NPfIT programme have been part of health service implementation programmes before NPfIT and there is evidence of their impact on users in the UK and elsewhere in the world. These data provide a useful crosscheck with the more limited data currently available about these applications in the NPfIT programme.

In the analysis that follows this combination of primary and secondary data is pieced together to draw, albeit early, conclusions of the impact of the programme with respect to:

- (a) The overall responses of NHS Trusts to the applications provided by NPfIT applications.



(b) The responses of healthcare teams to three specific applications within the National Programme:

- (a) Picture Archiving and Communications System (PACS),
- (b) Choose and Book,
- (c) Electronic Healthcare Record Systems.

### The reactions of NHS Trusts to NPfIT applications

In its early stages, the programme was broadly welcomed by healthcare staff who saw advantages to being able to exchange electronic patient information. In surveys, such as the MEDIX (2004) study of 558 medical staff, the medical, nursing and administrative staff of the NHS supported the objective of the programme although many felt there was inadequate consultation before it was launched.

In 2005 and 2006, the roll out of the programme really got underway and Trusts began to examine the applications that were on offer to them. Most of the Trusts planned to implement the applications as supplied but many concluded they could not or would not because the applications were not appropriate to their needs. A number of reasons were given. First, the system offered could not do the job. The Mental Health Trusts in London, for example, found that the electronic healthcare record system they were offered was designed for use in acute hospitals. It did not contain facilities to deal with the special issues of mental healthcare and, for example, had no provisions for handling patients according to the Mental Health Act that includes arrangements for sectioning patients. These are statutory requirements on Mental Health Trusts. As a result, in London, the Mental Health Trusts have been allowed to implement an 'interim' system specifically designed for patients with mental health conditions. Some Trusts, especially those with teaching hospitals, already have well-developed electronic healthcare record systems and they found that the system they were now being offered was less sophisticated and less well suited to their needs. 'Raising' everybody to a common standard has the effect of lowering the standard of those who already have a long history of developing these systems. The Royal Marsden Cancer Hospital (Milan, 2005) concluded, for example, that it could not maintain the cancer records it needed for research with the system it was offered and it will now continue with its own advanced system until near the end of the 10-year programme. GPs were particularly upset by the fact that the system that 60% of them had purchased would have to be replaced although it performed the same functions as the one offered by NPfIT. At the end of protracted negotiations the company that provided the system used by the GPs offered Connecting for Health, the agency delivering NPfIT, a version that was compatible with NPfIT and its product is now available to GPs as part of the programme.

In these and other ways the Trusts have been active in checking whether the systems offered meet their requirements and, because of the diversity of the Trusts and their history in the use of IT, many have challenged what has been offered. Connecting for Health and its suppliers have, as a result, varied what is being offered so that the programme is already at this relatively early stage providing a wider array of applications than was envisaged.

### Emergent sociotechnical system responses to three applications

The National Programme is delivering a range of applications and many have now been implemented in some Trusts. Information is therefore beginning to emerge about the responses of healthcare teams to these electronic applications. The information available is greatest in relation to three of the applications and these data are presented below.

#### Picture archiving and communications system (PACS)

The PACS system collects, stores and communicates electronic X-ray images and other forms of medical images. It replaces the previous film technology for X-rays. PACS has been under development for many years in the NHS and was not originally part of the NPfIT programme. It has now become part of the programme and is offered by the suppliers in the cluster consortia. All reports speak of its rapid take-up across the country. It is viewed by the radiologists, and other specialists who process and use these images, as an application with clear-cut benefits. It cuts out a lot of messy and time-consuming film development and provides good quality images. As a study before the NPfIT programme revealed (Cox and Dawe, 2002), electronic images can be processed faster, it is easier to find them in a store and they can be shared easily with colleagues. Although there are implications for staff work load and for the allocation of duties, the use of the system makes no specific demands and the application can be adopted in different ways to suit local circumstances. It appears to be a success story in the making.

#### Choose and Book

Choose and Book is a system that enables GPs to discuss with patients who need a referral for specialist treatment where the treatment might be undertaken and then to make an electronic booking. The system offers five alternatives and provides information about available appointments. The system is now available to GPs across England and there is some evidence that it is leading to faster confirmation of appointments and that, when patients are involved in the choice process, they are more likely to keep the appointments. However, there is also evidence that many GPs are making very limited use of the system. Bell (2007) reports that the Primary Care Trusts responsible for the GPs will all miss their targets for the proportion of referrals to be made using Choose and Book. The Government target was that 90% of referrals would be made using the system by March 2007 but, despite financial inducements to use the system, in the East of England, for example, only 20% were made using it. Surveys of GPs give many reasons for the slow take-up of the system; they report that many patients do not want choice, that the system does not provide the information they need about clinics, that it takes a lot of time to work through options with patients and that they are worried about the security of patient information put into the system. As a result, many are continuing with traditional methods of referring patients to consultants.

When they do use the system, the GPs are finding that they have to make organisational changes in their practices

to accommodate it. Collins *et al.* (2005), report, for example, that a work process has emerged in which the GPs offer patients medical advice about alternatives and then other practice staff help patients review other information, for example, travel arrangements, before making the booking for the patient.

### Electronic Healthcare Record Systems

The implementation of Electronic Healthcare Records is a central objective of the National Programme and progress here is slow and patchy. Efforts to introduce this kind of system have been made in the NHS for at least 20 years (Klein, 2001) and recent results are repeating the patterns of the past. The records are intended to contain biographic and administrative information about the patient, for example, when and where they were admitted to hospital, and clinical information, for example, the treatment they received and its outcome. What happens when these systems are implemented is that the records contain the administrative information but lack most of the clinical information. We can look at why this occurs, first by looking at the available information about what is happening across the NPfIT programme, and second by examining one particular case study of the implementation of an Electronic Healthcare Record System in a Mental Health Trust.

#### *The take-up of electronic healthcare records in NPfIT*

Healthcare record systems involve two kinds of interaction with the user community: first, healthcare staff need to enter the results of their engagement with the patient; and second, subsequent users can then access the information held about the patient. The issues that affect the take-up of these systems relate to the input of data and to access to the records. In the NPfIT programme there is an expectation that clinical information will be entered at source, by clinicians when they see the patient. This raises a host of issues for clinicians. Some see patients on home visits and may not have appropriate portable equipment. Many feel that entering data during a consultation with a patient interferes with the engagement with the patient. In many cases, the data required by the system is structured to enable statistical analysis and reporting of the data. However, clinical staff often wish to record informal, unstructured, notes to share with colleagues rather than final conclusions (Hardstone *et al.*, 2004). They are conscious that they could be held responsible for their clinical judgements and may wish to delay these decisions. It has been widely reported that GPs (BBC, 2006), as well as other clinicians, are particularly anxious about the confidentiality of patient records and do not wish to enter information that could get into inappropriate hands. As a result of all of these issues, clinicians often enter little or no information of a clinical nature into the system and they have sufficient discretion to maintain this approach. By contrast, administrative staff have limited discretion and the record is highly likely to contain the more factual information that they are expected to enter.

The response of the user community to data input has an impact on the user community when they come to use the records. One intention of the programme is that paper

records disappear but, in many circumstances, what is emerging is a mixture of electronic and paper records in which most of the clinical information is in the paper records. This obviously affects how much information can be electronically shared between Trusts, the main objective of the NPfIT programme. The widely expressed concern about the confidentiality of patient records is also having a powerful effect on access to the electronic records. Connecting for Health have introduced a smartcard system for all users of electronic healthcare records, which limits the holders access to the patient record to what they need to know. This is determined by nationally established Role Based Access rules – a doctor has more access than a nurse who has more access than a clerk, etc. When a user is trained, they are registered to use the system and issued with a smartcard that determines their degree of access. However, other initiatives in the health service are encouraging collaborative team work across the disciplines involved in healthcare delivery, and differential smartcard access can make it difficult for team members to share information about patients. Another initiative is the policy of devolving more responsibility for patient care from medical staff to nursing staff, which increases flexibility in local organisational arrangements. However, this can be lost if the access rules for the electronic records do not reflect this flexibility. It is widely expected that, faced with these obstacles to access, clinical staff will find ‘workarounds’ such as sharing the smartcard of the most senior user, to enable them to work together to deliver patient care.

A particular example of this issue arises from the fact that to access a patient record a user has to enter their smartcard and password, a process that takes about 90 s each time. The medical staff of the Accident and Emergency Department of South Warwickshire General Hospitals Trust (Collins, 2007) have declared that, although it is against the rules, they will all use one smartcard, left in the computer for the shift, so that delays in urgent patient care do not occur as they each enter their own smartcard.

#### *A case study in a Mental Health Trust*

In one specific instance, we have worked with a Mental Health Trust to help them engage with the sociotechnical systems issues associated with the implementation of an electronic healthcare records system. Although the application is part of NPfIT, the system is an interim solution specifically selected because of its previous use within mental healthcare in the UK. In contrast to many others, the Trust now has a system in place that gives staff an access to clinical as well as administrative information. Here are a selection of the issues they faced in achieving this outcome:-

- *Giving users access:* They found many conflicts between helping staff operate as a team in healthcare and protecting patient confidentiality. They were supposed to limit access according to the role responsibilities of each member of staff but the staff said they would be unable to share information and work together. The IT staff adopted the ‘workaround’ of granting each person a higher level of access as would befit someone of higher status.

- *Entering data:* Clinical staff encountered many difficulties in entering data in the system when working with mental health patients. They have developed many strategies to get the data into the system that include giving the information to administrative staff to enter that is later confirmed by the clinical staff.
- *Training:* It proved very difficult to identify everyone who needed training and give them what was necessary. The turnover of staff, knowing who was currently 'suspended' or away for other reasons, the use of contract and part-time staff, etc, meant that identifying all potential users was difficult.
- The technical facilities of the system were generally good and could be used in a flexible manner. There was, for example, some choice possible about the assessment records that could be included for different medical conditions. However, the IT staff have produced a list of technical amendments they require and this has been fed back to the suppliers. The one change they had to insist on before the system could be used was that it had to include all the provisions of the most recent Mental Health Act.
- There were many examples where the assumptions of the system were out-of-gear with practices in the Trust. It assumed, for example, that when a patient was discharged there would be no further contact with the patient unless they were re-admitted. However, long-term mental health patients often came to see the staff they trusted without another referral. Another example is the bedstate function of the system that displayed which patient was in each bed on a ward. The system allowed patients to be 'on leave', that is, at home for the weekend. However, in long-stay mental health wards, patients often went on leave and either stayed away a long time or never returned. The local practice was that they were not formally discharged under these circumstances but remained patients in the care of the Trust. However, when patients did not return the ward staff gave the bed to another patient. When the new system was loaded with the bed state information, it showed that many beds were occupied by more than one patient. As a result, it may be that the bedstate function will not be used in the Trust.

The overall assessment of the IT staff is that users are finding effective ways of entering data into the system that make minimum disturbance to their existing practices. Some healthcare teams are also finding ways of working electronically to share information and improve the quality of patient care but there are other teams who have made little change in their practices.

#### Local responses to NPfIT applications

Although it is relatively early in the roll out of the National Programme, we can begin to summarise the response of user communities to the electronic applications. There is strong evidence that the health community is very active in making decisions at many levels about its response. At the level of the Trusts, there is a considerable degree of negotiating occurring with Connecting for Health that was not part of the original plan. A striking feature of the responses of healthcare teams when an application is

implemented is the diversity of the responses. We can discern five patterns of response:-

- (a) *Successful adoption:* The one instance where adoption appears to be going as planned in many Trusts is the implementation of PACS. The benefits of the system are clear to users and it appears that adoption is not leading to major organisational problems.
- (b) *Partial use:* A very common response, especially by users who have discretion (Eason, 1996), is to use some facilities of the system but to ignore many others. The most obvious examples in NPfIT are the relatively low level of use of Choose and Book and the non-entry of clinical data into the electronic healthcare records. In both cases, clinical staff have other, existing, mechanisms for accomplishing their tasks and, because they perceive difficulties associated with the electronic way of working, they are continuing to use them.
- (c) *Workarounds:* Another very common response occurs when the system is intended to be used in a way that local users deem to be inappropriate for the work they are undertaking – they find a way to 'workaround' the difficulty. It appears that healthcare teams, for example, are finding ways to 'workaround' the restrictions in access to records that the smartcards are creating.
- (d) *Stress, failure and delay:* There are also many examples where implementation has been problematic, delayed and stressful. There have been some well-publicised failures, for example, the Nuffield Orthopaedic Centre hurried some data migration and lost the records of many people who were scheduled for clinic appointments. As a result, they were reported to the Patient Safety Agency. In another example, a CSC datawarehouse failure meant hospitals in the West Midlands were without their electronic patient records for several days. Fortunately, they still had paper records they could use. The implementation of a Patient Administration System in Queen Mary's Sidcup NHS Trust was seriously delayed when it was found to be incompatible with the Choose and Book System (Clark, 2006).
- (e) *New forms of organisation:* Where usage is beginning to develop, there is evidence that new forms of work organisation are beginning to emerge. Offering patient choice by using Choose and Book, for example, is not just a role for the GP but involves other members of the practice. Getting clinical data into electronic records may also not just be a task for clinicians. It may involve sharing tasks with administrative staff.

The responses to NPfIT applications are many and various in part because of the diversity of the applications and in part because of the diversity of the local situations into which they are being introduced. We can, however, draw two tentative overall conclusions. Where the end users see clear benefits and no major organisational problems, as in the case of PACS, implementation may proceed broadly as intended by system developers. Where the benefits are less clear to end users and there appear to be many local working practice and organisational issues, users tend to respond by limiting the impact of the new system on existing practices. The second outcome seems in the National Programme to be more common than the former.

If this becomes the dominant response, it is not likely that major benefits in patient care will result from the massive expenditure in the programme.

### Implementation and local design

Are the outcomes described above inevitable as the programme is rolled out or are there opportunities to exploit these technical systems in ways that meet the needs of local healthcare teams? Is there flexibility in the systems and the way they are implemented that provides the opportunity for local sociotechnical systems design to achieve these ends? The issues that users are encountering and that are creating obstacles to use, are often ones that could be worked through locally. As a first stage in answering these questions, a survey of six Trusts was undertaken by interviewing 10 members of the IT staff who are currently involved in the implementation of NPfIT applications. They were questioned about the processes of implementation and of the opportunities within them for local design work with the user community.

The IT staff described the implementation process as one in which the suppliers have a limited window of time in which to install each application. The suppliers are working to a tight roll out schedule and are under pressure to meet deadlines because they get paid when technical implementation is complete. Although supplier effort is free to the Trusts, the local IT staff are not responsible for the contract with the suppliers and have limited control over the process. The dominant features of the implementation process are data migration (of patient records to the new system), user training and user registration so that smartcards can be issued. This agenda enables the technical system to 'go live', existing systems to be withdrawn and users to be in a position to use the system. The process does not formally address changes in working processes and organisational changes. However, accompanying the implementation process is a 'management of change' procedure that seeks to guide the local working system from its 'as is' state to a 'to be' state that achieves the benefits of electronic working. It is unclear to interviewees how much pre-definition is assumed in the 'to be' state and it probably varies from application to application. The expected working practices associated with Choose and Book are, for example, tightly defined in terms of offering patients choice and making electronic bookings. The working processes associated with using electronic healthcare records are less tightly defined, except with respect to entry of data at source and controlled access to the records.

It was the view of the interviewees that there was considerable opportunity in the implementation process to customise the applications to local needs and to determine the working practices associated with the system. It was theoretically possible to ask for changes in the technical system. However, changes had to be agreed with the other Trusts using the application and this would inevitably mean a long delay before they were implemented. The interviewees also pointed to difficulties in getting users involved in making decisions about working practice with the new system. The limited timescale for implementation, for example, seemed to preclude trials and experimentation with the system. In two cases, Trusts had decided they

would adopt a phased roll out of the system across the Trust even if the suppliers were against such an approach. Another problem was that staff had little understanding of the applications being offered. Attempts to get them interested before the applications were due had not been successful because the health staff were usually preoccupied by the implementation of other initiatives.

The conclusions of interviewees about this process was that it was, at best, likely to lead to staff being able to use the new applications and to the beginnings of a process of exploring what value they might have. At worst, it would lead to a search for ways of minimising the impact of the application. For the IT staff the ever present danger was that implementation would be rushed, data would be lost or corrupted and patients would be put at risk. Their priority was to get the new technical systems in so they operated safely and reliably. They saw the wider issues of getting benefits through a new sociotechnical system that worked more with electronic records as something for the whole user community to pursue.

### Mobilising work on local sociotechnical systems design

The initial question for this paper was whether a centralised technical development of this kind left room for local design and application. In most circumstances, the answer seems to be that opportunities to do local sociotechnical planning are available but the policies and practices in the implementation process are not likely to encourage it to happen. It is most likely that there will be a range of *ad hoc* responses from different users that will probably marginalise the effects of the new system. Some of these responses may be useful to individual users but they may equally be dysfunctional for the work system as a whole. What is missing is a shared and informed approach by the local user community that might enable them to get collective benefit from the new technical facilities in the interests of improved patient care.

We have been promoting a different approach to the implementation of NPfIT systems and have had some opportunity to pursue this approach in the Mental Health Trust with whom we have been working. We have developed a local sociotechnical systems design approach with the Trust where the aim is to treat the new technical system as a capability being offered, which the local user community needs to examine for the benefits it might confer. They can then look at how to achieve these benefits, whether that be by customising the facilities it offers, for example, by selecting some features and ignoring others, changing working practices and procedures or introducing organisational changes. There is recognition that this cannot be achieved overnight and a process has to be developed that enables a gradual evolution of new practices as users become familiar with what is now possible.

In working with the Mental Health Trust, we have identified a programme of activities that would enable healthcare teams to accomplish these ends working closely with the IT staff in their Trusts. The programme is explained more fully elsewhere (Eason, 2005) but has the following five elements:

1. A standing sociotechnical systems committee is established with representation from all interested

- stakeholders to oversee the process of implementation of an application and its subsequent adoption by staff.
2. Transitional systems are established that enable users to work on what is possible, that is, how might healthcare be delivered using the new technological capability, away from the pressures of everyday work.
  3. Before implementation, we have worked with scenario-based workshops in which users explore the implications of the planned technical system and work out what local benefits might be achievable.
  4. During the implementation process, phased introduction of the system is needed to provide space for shared learning and for planning the particular technical configuration that might be appropriate for local needs.
  5. After implementation, there is a need to create review opportunities so that users can explore new working practices as their understanding and trust in the new technical capabilities develops.

The Mental Health Trust have, to date, employed these techniques before and during implementation in some parts of the Trust and are getting positive take-up of the technical facilities. They have demonstrated that in the NPfIT programme, it is possible for the user community to work through local issues and find solutions that enable the benefits of new ways of working to be explored.

#### **Discussion: Standardisation, diversity and the locus of design**

The National Programme is an attempt to enable electronic exchange of patient information across England by standardising the electronic healthcare record systems in use in all of the Trusts across the country. In the first few years of its existence, it is running into difficulties in part because there is enormous diversity in these Trusts and the match between what is offered and what is needed is often very wide. Although it is relatively early in the planned life of the programme, it is apparent that in some cases this leads to Trusts rejecting what is offered and in other cases, the healthcare teams limit or construe what is offered in a way that does least damage to their work. The National Programme offers a suite of applications and it is also interesting that at least one of them, PACS, looks like being a successful application that can work in many different Trusts.

This paper has looked at the possibility in a large centrally directed programme of engaging in local design work to adapt that is offered to the needs of the local sociotechnical system. The starting point, from the initial formulations of sociotechnical systems theory, was that the technical system may or may not have the 'minimum critical specification' to enable local design to take place. In the context of the National Programme this now appears an over-simplistic assumption. It would be more accurate to say there are some features of the National Programme that create the potential for local design and many that do not. The technical features of the applications vary within themselves in the flexibility they afford. Some of the technical features have deep, structural implications for working practice and work organisation; for example, the need to offer patient choice and the access rules for patient records. However, some aspects of these technical systems can be customised for local use, some features can be

implemented or not implemented and they can be used to support a variety of working practices and allocations of duties between members of staff. There appears to be a lot of opportunity for local design of the link between the technical and social system if the local community wish to take it.

One interesting feature is that many of the structural features of the programme that make local design difficult are not directly a property of the technology; they are the result of implementation policies, contractual issues between Connecting for Health and its suppliers and 'best practice' imperatives that the NHS is trying to promote throughout Trusts, for example, offering patient choice and entering electronic data at source. In particular, the rapid roll out schedule and the technical nature of the implementation process do not invite a reflective and design-oriented approach on the part of local IT staff and users.

The conclusion we might draw therefore is that the technical systems provide considerable opportunity for local sociotechnical systems design but the NPfIT programme in its entirety makes it difficult, but not impossible, for a local strategy to be effective.

A theoretical implication of this analysis is that any formulation that divides the agents involved in technical system development into technical designers and local users is very much too simplistic. The National Programme shows that there are many agencies involved in shaping the system that reaches the users. Each agency can be considered a locus for part of the decision making; the suppliers have made technical decisions about the applications they offer, Connecting for Health have made strategic decisions about the over-arching coordination of the technical programme and the form of the implementation programme, the NHS has policies and practices it wants to see implemented at Trust level and, at the Trust level, decisions are being taken about IT policies that make sense in the Trust. We can add to this a *de facto* locus of decision making at the individual or health team level when users decide what to use or not to use of the electronic facilities that are offered.

What implications are there for other settings where there is a need to implement a coordinated information technology system across a large, diverse organisation and the ambition is to allow as much opportunity for local sociotechnical design as possible? Perhaps the main lesson is that the diversity of local sociotechnical systems cannot be denied and the needs of diverse settings will have to be recognised somewhere. An analysis that recognised the different agencies involved in the development process and examined what decisions are appropriate to what agency might avoid the difficulties the National Programme is encountering. It might, for example, recognise that diversity means many decisions have to be made locally and that, at the central level, the most important decisions are the protocols by which data can be exchanged between applications. The technical developers could then focus on meeting functional needs in a flexible way within the protocols laid down. This then could permit local organisations to adopt technical systems in ways that meet local needs and enable them to engage in sociotechnical systems design at a level where the local user community can play a full part.

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