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THE VISION AND REALITY OF 'CONNECTING FOR HEALTH': TENSIONS, OPPORTUNITIES, AND POLICY IMPLICATIONS OF THE UK NATIONAL PROGRAMME

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Abstract:

Mega-programmes are prevalent across the world in areas of national importance, such as health, education, and security. In the United Kingdom, the National Programme for IT (NPfIT), coordinated by the agency 'Connecting for Health' (CfH), is one such example. This programme aims to transform the provision of healthcare through the creation of a new IT infrastructure connecting doctors, nurses and health care professionals across England. This network will support a range of online applications, for maintaining patient records, booking appointments, prescribing medication and transferring digital images. The vision of a fully information-driven National Health Service is attractive on many grounds, yet no nation has found it easy to realize. In this paper, we present four perspectives on the implementation issues surrounding the UK Programme, which address a cross-section of the expectations and anxieties of those involved, and the multiple outcomes achieved. We examine the tensions and opportunities in what is taking place, and draw out policy implications from our work.

Keywords: healthcare, electronic patient records, electronic prescribing, ICT policy, implementation issues, National Health Service, programme management.

I. INTRODUCTION

Around the world the implementation of information and communication technology (ICT) is proposed as a way of transforming healthcare, making it 'better' (e.g. safer, more accessible and patient-centred) and more efficient by facilitating the management of healthcare organizations and processes. The implementation of ICT has been a vital component of the UK government strategy for the National Health Service (NHS) for at least a decade, most recently expressed in the National Programme for Information Technology (NPfIT) for England, considered as the biggest nonmilitary initiative of IT implementation in the world and now subsumed in the wider institutional structure of 'Connecting for Health' [Brennan 2005].

The National Programme is a 10-year change initiative dating from 2002, which was originally estimated at a procurement cost of £6.2 billion, although recent projections suggest it may cost £20 billion in the end [National Audit Office 2006]. The aim of the programme is to deliver a 'system of systems' supported by a nationwide IT infrastructure and network covering all of the strategic health authorities in England. The critical applications will provide electronic facilities for sharing patient records, booking appointments, transmitting prescriptions and transferring digital images (e.g. X-rays and scans) and will be supported by ancillary services such as e-mail, online directories and Web sites.

Aspects of this programme will resonate with citizens across the world. For example, electronic patient records (EPR)[1] are being introduced by the health services of many countries, particularly in Europe and North America. Furthermore, many nations are working on the use of ICT for the transmission of prescriptions and the administration of medicines (e-prescribing). However, the relevance of the Connecting for Health programme, the issues arising, and their implications for ICT policy are not limited to the developed world. The programme entails far-reaching organizational and cultural change and the creation of a new technological as well as social infrastructure to support the new arrangements for patients and health service staff. Such attempts to transform the established order, the inevitable anxieties for those involved, and the variability in the types of outcomes achieved are aspects of ICT innovation that are also well understood among the developing nations.

The vision of a fully information-led health service is appealing on clinical, economic, social and political grounds, yet no country has found it easy to realize [Sauer and Willcocks 2007]. Many reasons have been put forward for a slow pace of ICT adoption in the UK NHS, including the gap between the government's vision and the realities 'on the ground' manifested, for example, by the lack of adequate resources (e.g. skills and technologies) and attitudes to ICTs and reforms in general, as well as the complexity of the systems needed.

This paper documents a panel discussion led by the authors at a recent conference on the social implications of ICT policy (HCC8, the 8th Human Choice and Computers conference). Specifically, we examine the implementation issues surrounding various aspects of the Connecting for Health programme and present policy implications from our research. Each author offers a different perspective on the programme, acknowledging both the diversity of agencies shaping the proposed systems and the multiple loci for decision making and interpretation of the government's vision. To that end, we address different application areas (e.g. electronic patient records and electronic prescribing), a range of implementation issues (experienced by suppliers, trust managers and staff) and the diverse expectations of various interested parties (e.g. politicians, government agencies, patient groups, academics, and the press). We illustrate the issues raised through the use of practical examples drawn from our own research and secondary data available from government publications, academic journals, and other documentary sources.

The remainder of this paper is organized as follows. In the next section, Kathy McGrath provides an introduction to the context and purpose of the Connecting for Health programme. She then draws on her research on the use of an electronic patient record (EPR) system in a London teaching hospital to suggest why the promising vision associated with this critical element of the National Programme is proving difficult to realize. Ela Klecun describes a study of the deployment of electronic prescribing[2] (EP) systems in two UK hospitals, contrasting their models of implementation

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[1] This initiative is also referred to as electronic medical records (EMR), electronic health records (EHR), care records service (CRS) and other similar titles.

[2] E-prescribing is also referred to as Computerized Physician Order Entry, CPOE, primarily in the USA

and focusing on challenges faced during the introduction and subsequent use of the systems. She then draws lessons from the studies and makes suggestions for future implementations. Jane Hendy goes on to argue that many of the National Programme's original goals have not been realized. Having studied the implementation of the programme from its inception, in four NHS acute hospitals, she outlines the problems encountered and discusses lessons that can be learned from England's experiences. Finally, Terry Young summarizes the issues raised by the National Programme in terms of a framework of five critical tensions between: rhetoric and reality, the short and the long term, the local and the national, the management and the clinical, and the interactive and the interpersonal. He then goes on to show how this framework might support a more effective dialogue among stakeholders in the programme.

II. THE NATIONAL PROGRAMME FOR IT (NPFIT) IN THE UK NHS

For about a quarter of a century, successive UK governments have been attempting to modernize the National Health Service (NHS) as part of an extensive programme of public sector reform aiming to create an efficient, "consumer-led" model of healthcare provision for British citizens. The National Programme for IT (NPfIT) represents a recent and ambitious initiative to use ICT to support the proposed reforms. The programme comprises the following four critical application areas supported by a new nationwide IT infrastructure:

- Electronic patient records (EPR), which are computerized general practice records containing medical information on individuals which can be shared among health care professionals countrywide;

- Electronic prescribing (EP), which involves the use of ICT for the transmission of prescriptions and the administration of medicines;

- Choose and Book, a computerized system for booking hospital appointments which allows patient choice among a range of hospitals;

- Electronic transfer of digital images, such as scans and X-rays, via PACS (Picture Archiving and Communication System).

Connecting for Health (CfH) has been appointed by the Department of Health as the coordinating agency for driving forward the implementation of NPfIT. CfH suggests that the programme will drive modernization of the NHS and also support the NHS infrastructure by promoting knowledge management and technology-assisted decision making by clinicians, while providing training and development for all NHS staff. NPfIT aims to connect over 100,000 doctors, 380,000 nurses and 50,000 health care professionals [Connecting for Health 2006a], replacing a paper intensive system for communicating within and among these groups. Commentary on the CfH Web site suggests that clinicians spend unnecessary amounts of time finding, recording, and communicating information on paper, with nurses in particular spending over two-and-a-half hours per day keeping manual records [Protti 2006]. Furthermore, the Audit Commission estimated that approximately 1,000 deaths take place each year as a result of medical errors made by clinicians who lack access to necessary patient information at the point of care, and that 75 percent of these lives could be saved by the use of modern computerized systems [Audit Commission 2001].

The core ideology of NPfIT is based on the view that ICT is a means of providing better information to clinicians which will enable them to provide better healthcare for patients. In recent years, the use of information systems in healthcare has increased sharply amidst promises of improved data accuracy within patient records and reduced paperwork freeing up more time for patient care. Some studies [Darr et al. 2003; Likourezos et al. 2004] report these promises being fulfilled and growing enthusiasm for the systems amongst clinicians. Other work highlights resistance to the use of the systems and perceptions that they have a negative impact on patient care [Darbyshire 2004; Timmons 2003; Wainwright and Waring 2006]. Official sources claim that key lessons have been learnt from prior IS implementations within the NHS which will pave the way for NPfIT. Nevertheless, the National Audit Office (NAO) has criticized CfH for focusing on the procurement of activities rather than communicating with NHS staff about the NPfIT strategy so as to win their support for the proposed systems [National Audit Office 2006]. In the sections that follow, the authors highlight findings from their own research on the UK National Programme.

III. A CASE OF ELECTRONIC PATIENT RECORDS (Kathy McGrath)

Electronic patient records (EPR) may be described as general practice records containing data on an individual with a list of entries about the individual's medical health [Hassey et al. 2001]. Perceived benefits from the use of EPR include increased accessibility of patient records and a clear and readable format which tackles problems with the legibility of clinicians' handwriting. Current systems provide a range of basic functionality, enabling clinicians to place orders for tests and medication, while facilitating communication between the pharmacy and multidisciplinary departments. CfH reports positive changes to the way clinicians work through the use of EPR at Salford Royal Hospital [Connecting for Health 2006b].

The LTH Case

My case study was based in a large teaching hospital in London (referred to by the acronym LTH) and focused on nurses' use of EPR [McGrath et al. 2007]. LTH has more than 5,000 staff—of which about 2000 are engaged in nursing and midwifery—and serves a local population of approximately 700,000. LTH went live with a pilot implementation of its EPR system in January 1999 and by July 2002 had completed full rollout of the results review and order communications parts of the system across all wards and outpatient clinical areas. Development of the EPR continued in the following years, so that by March 2005 LTH could claim to have reached the nationally defined goals for EPR systems [NHS Executive 1998]. Data for this case study were collected in 2006 by means of interviews with nursing staff, IT developers and hospital managers and via observations of working practices on two wards. The use of EPR at LTH was driven by national priorities concerning the availability of information and the perceived time consuming nature of some existing work practices, but it challenged local mechanisms and processes with differential outcomes.

In this case, we found that, while nurses commented positively about the potential of EPR, and claimed to use the system in support of their daily work practices, the reality was rather different. On the wards, the current state of the art in nursing practice still involves a mixed economy of paper and electronic records, and a considerable amount of manual record keeping maintaining individual patient care plans, medical notes and nurses' notes. Judging by their actions, only a few nurses willingly accepted the new roles and responsibilities entailed in moving to an electronic system of patient records. Indeed, several of them found ways around maintaining the EPR by delegating their responsibilities to other members of staff. Crucially, there was evidence that the use of EPR was not fundamental in supporting their daily work practices. Rather, in nurses' judgements of what their job entailed and their sense of identity, the EPR technology was largely irrelevant.

Nevertheless, the nature of the wards was significant in the way that nurses used EPR. Where staff could plan their use of the system—for example, to support compulsory screening for MRSA (Methicillin-resistant staphylococcus aureus)[3] before patients were admitted to the wards—EPR was viewed more positively. On the other hand, where nurses needed to use EPR in an ad hoc fashion—say, for printing labels and making referrals to multidisciplinary teams—they were more likely to avoid or delegate the task owing to the remoteness of the work station from patients' bedsides or because they might experience contention for access to it. Thus the different work practices on different wards within a single hospital can potentially impact the extent to which an application such as EPR is used. This finding suggests the need for multiple modes of implementation for key applications within the National Programme, involving both stationary computer terminals and mobile technology within a single site as well as across the diverse range of sites involved in the programme. Furthermore, there was evidence from our study that mixed modes of training—involving formal sessions in advance of implementation as well as on-the-job training—were useful to staff. Such variations have cost and resource implications, for both the NHS trusts[4] and the suppliers of the systems, as Klecun (next section) also argues.

A key finding from our study was that LTH managers were making little effort to ensure that nurses used the EPR system for anything other than the most basic functions. Nor were they striving in the short term to achieve the integration of patient care plans, medical notes and nurse's notes onto EPR. Faced with a number of operational challenges, managers sought to avoid direct confrontation with nurses about the use of EPR. Specifically, NHS trusts across the country are experiencing staff shortages, very busy wards and the need to contain spending, alongside spiralling implementation costs for the information systems mandated by the National Programme. Nurses are key players maintaining the quality of service in these circumstances, both as carers for patients and trainers of newly qualified doctors when they begin work on the wards.

The NAO has suggested that the NHS needs to win the support of its staff by making more effort to engage them in the NPfIT strategy and the development of its constituent systems, such as EPR [National Audit Office 2006]. Nevertheless, calls for better training and increased efforts to win the support of staff address no more than symptoms of the issues surrounding the new electronic application. In light of the operational challenges I have outlined above, cutbacks on training and support activities associated with the new applications are a pragmatic, but short-term, response by trust managers striving to balance their budgets and improve their performance ratings.

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[3] MRSA is a bacterium that is resistant to a large group of antibiotics. Hospital patients are particularly at risk, since they may have open wounds and/or weakened immune systems.

[4] An NHS trust is a public sector corporation which provides services on behalf of the NHS in the United Kingdom. Hospitals, ambulance services and other healthcare organizations have been granted trust status, in which they manage operations through their own board of directors within the overall national, publically funded system.

The Broader Picture

Mega-programmes such as Connecting for Health pose management dilemmas since their sheer scale implies that they will not meet initial expectations. Such programmes experience the typical project characteristics—of time and resource needs, a variety of stakeholders, uncertainty and unpredictability—on a massive scale, such that it is impossible to plan accurately or anticipate all of the problems that may arise. In such programmes there is a natural tendency to downplay the full cost for fear of frightening off the funders [Sauer and Willcocks 2007]. My own conversations with IT consultants, other anecdotal evidence [ibid.], and research studies [Willcocks and Lester 1999] suggest that this process has often played out as a game in which numerous stakeholders are complicit. Based on the assumption that the programme will inevitably be reassessed and replanned farther down the line, key players avoid confronting the full cost of implementation and hence the question of whether such cost can be justified in terms of the potential benefits. Often, the full cost of the programme can be three or four times the original estimate—a phenomenon now evident in the UK National Programme [National Audit Office 2006].

If one accepts the position that national IT programmes are necessary in some cases, questions arise about how they should be justified and evaluated. I suggest that considerably more effort needs to go into the justification process—this means more negotiation with suppliers, more consultation with end-users, and more public debate. If such negotiations kill off the programme, then the will to implement it was surely lacking in the first place. However, if in the face of intense scrutiny of their projected costs, suppliers, and purchasers can make a convincing case for the way they intend to spend taxpayers' money, then they should have the necessary support to face the eventual problems arising. In these circumstances, commentators would need to adopt a more realistic approach to assessing the performance of the programme than measuring progress against plans and outcomes against targets. Rather than levelling criticism at suppliers for under-performance, they would need to accept the impossibility of accurate planning and risk prediction without sacrificing the public interest to groundless optimism. In short, action is required by institutions to engage, from the outset, in more open and honest public debate about the prospects for such programmes, which would better serve the public interest [Sauer and Willcocks 2007].

IV. ELECTRONIC PRESCRIBING (Ela Klecun)

The use of ICT to reduce errors has been a major element of UK health policy [Smith 2004]. Originally, the government plan was to implement electronic prescribing in all acute hospitals by 2005 [NHS Executive 1998], but this deadline has been extended for all hospitals to 2008 to 2010. So far, very few of these hospitals have actually implemented hospital-wide e-prescribing, despite the UK being amongst world leaders in the introduction of e-prescribing into primary care. Even in the U.S., widely perceived as a leader in the field, less than 10 percent of hospitals have e-prescribing systems [Coiera 2004].

Between 2003 and 2005, I took part in a Department of Health funded project evaluating e-prescribing in two hospitals in England and developing a comprehensive evaluation framework and methods for assessing the impacts of such systems. The evaluation of both systems included a quantitative study (focused on the safety and efficiency of e-prescribing) and a qualitative study that explored the experiences of IT staff, health care professionals and managers in developing the system and working with it. We also explored patients' experiences with the processes of prescribing and administering medication. Here, I focus on one aspect of the evaluation, i.e. implementation lessons and their implications for local and national policies. More information about the project and its findings can be found in the following articles [Barber et al. 2007; Franklin et al. 2007] and the full project report [Barber et al. 2006].

E-Prescribing in Hospitals X and Y

The e-prescribing systems addressed by our study were initiated by the hospitals prior to the implementation of the NPfIT programme. The results of their evaluation have been submitted to the Patient Safety Research Programme (Policy Research Programme of the Department of Health), with the intention that they would influence the implementation and evaluation of e-prescribing in other sites.

The first system was piloted between 2003 and 2006 in a 28-bed general surgery ward in a London teaching hospital (henceforth referred to as hospital X). It was an automated, 'closed loop' prescribing and administration system, with limited links to the rest of the hospital's information systems. The setting for the second system was an English district general hospital (henceforth referred to as hospital Y) which had implemented over time a hospital-wide, integrated electronic prescribing, administration and records system. Medical notes were maintained in the traditional paper format, but all other records were made and stored electronically. The system had been extensively developed and customized since the initial pilots between 1994 and 1996. In both cases, data were collected by means of interviews and observations (on the wards and in the pharmacies) involving doctors, nursing staff, pharmacists, hospital managers and a number of adult patients. A focus group session was also held at hospital X, nine months after the system went live, at which doctors, nurses, pharmacists and hospital managers discussed

their experiences with and attitudes towards the system. We also attended a number of project meetings at hospital X and reviewed project documents.

Although the two hospitals and their e-prescribing systems are very different, and the timescales, strategies and scope of the projects were dissimilar, lessons relevant to any hospital and to the NPfIT can be identified. These lessons are not particularly unexpected or new. And yet they are often (and for many reasons) ignored or discounted. For this reason, I shall reiterate them, emphasizing their implications for NPfIT.

Lessons Learned

E-prescribing systems must be seen as socio-technical systems or ensembles, where social and technical aspects are closely intertwined. Prescribing is embedded in the work practices of different people (most obviously health professionals, but also health managers and patients) and performed in its local (ward, hospital) and wider (national and international) contexts. Hence, care has to be taken to align such systems with particular organizational goals, existing work practices and the interests of diverse stakeholder groups. However, 'alignment' might not be enough. To take advantage of the potential of new technology to improve service delivery, healthcare processes and organizational structures might have to be redesigned [Clegg and Shepherd 2007; Eason 2007].

When should such re-designing take place? It might be advisable to consider major changes to the way healthcare is organized and delivered before technological solutions are finalized. Computerized systems often offer some degree of flexibility. However, they also make it harder to change practices embedded in them. For example, the system in hospital X structured and automated the process of administering medicines to patients in a way that made it difficult to combine with a new initiative for storing patients' medications in bedside cabinets.

Yet, not everything can be thought out in advance, particularly when the capabilities and functionalities of the new system are not known beforehand. Our research results indicate that much of the designing and shaping takes place in the local context and over a lengthy period of time. Acquiring technology is just the start of the process. Through use, work practices and technologies co-evolve and, as a result, information systems are designed—a process described by Lin and Cornford [2000] as 'in use design'. In both hospitals this process has taken months or even years, and it has not got a clear end as new upgrades are being introduced. However, Clegg and Shepherd [2007] argue that the NPfIT's focus is on technological solutions, which is detrimental to achieving improved service delivery.

To facilitate the process of 'in-use design', the technologies need to be flexible and often close co-operation with the suppliers is needed. The two hospitals under study have worked closely with their suppliers who were willing to customize their systems significantly to fit in with local practices. Both hospitals were considered important for the suppliers' strategy to conquer the UK market. Such co-operation is harder to achieve on a larger scale programme, involving many different healthcare organizations and technology providers. Suppliers might not be willing to spend much time and money on customization of the software for every implementation site (e.g. hospital). However, a system which suits one hospital might not be the best for the next one. Unfortunately, in an attempt to enforce standards, NPfIT has introduced additional layers between hospitals and software developers, making elicitation and realization of requirements difficult.

Furthermore, the processes of implementation, adoption and appropriation must be resourced. Continuous hands-on support is essential during the initial period after the implementation. Formal training, although often useful, is not enough. Our research suggests that doctors and nurses prefer to be helped while using the system. This requires resources, including extra money and trained staff willing to be 'super users' helping their colleagues. However, the resources of NPfIT are largely directed at the development of the software. Training and support is left to over-stretched hospital budgets (and might become an easy target of budget cuts).

Much of the management information systems literature highlights the importance of project champions and the need to secure sustained commitment from top management. This is true in the healthcare setting, too. We have found that the support of doctors is particularly important, and in hospital Y some of the doctors have taken the role of champions of the information system. However, different stakeholders, not just doctors, have to be persuaded (one way or the other) to use the system. We have found that data is one such instrument of persuasion. In hospital X, nurses' views about the efficiency of the system shifted somewhat when the evaluation results indicated—contrary to initial perceptions—that some of the tasks they performed around the administration of medicines did not take longer. As the nurse in charge put it 'data speaks'. Another tactic to gain support is to choose an early implementation for those systems which deliver clearly visible benefits to clinicians. In hospital Y, the integrated hospital system was implemented in stages. Parts of the system which enabled clinicians to see the immediate

benefits of computerization were implemented first[5]. In many hospitals Picture Archiving and Communication System (PACS) has proved to be such an application. It offers clear-cut benefits and appears not to cause major organizational problems [Eason 2007]. According to NHS CFH Weekly Digest [2008], PACS is now used in 100 percent of hospital trusts in England.

At national level, clinicians have been appointed as national clinical leads (NCLs) for NHS Connecting for Health to ensure clinical engagement with the NPfIT. However, repeated concerns have been raised about the limited level of clinician involvement in, and consultation over the NPfIT, and in November 2007 a survey of over 1,000 clinicians by Medix-UK found that few doctors knew very much about the programme and most said that they have not been adequately consulted. Furthermore, 74 percent of respondents said that, to a greater or lesser extent, they were not engaged in the programme, while 27 percent stated they were not at all engaged compared with only 2 percent confirming that they were very engaged [Medix 2007]. Clinicians are busy people and hence difficult to engage in activities which they do not perceive as core to their work or if they do not believe their opinions will influence strategy. This is a challenge for the NPfIT. And yet the survey confirmed earlier Medix findings that the majority of doctors supported most of NPfIT's key features and believed the programme likely to benefit clinical care (although this support has weakened over the years).

In summary, there is no silver bullet or magic wand which would make the implementation of e-prescribing (and any other systems) easy. What is required at local and national levels is a commitment to working out solutions. The implementation and subsequent use involves negotiating diverse professional and organizational cultures and different needs and goals of healthcare organizations and professionals, suppliers, and government agencies.

This study and other research [Eason 2007] suggests that control over implementation should be held locally, and that locally-driven systems developed in response to local pull (rather than central push), in co-operation with suppliers, and modified to suit local needs are more likely to succeed. The NPfIT vision is to deliver systems that are easily interoperable (at least within each cluster, i.e. region served by the same local service provider), allowing for easy exchange of data supported by a similar interface and functionality. This has been translated into the need for standard systems. However, should central government strive to impose information systems on the NHS? If such an approach is causing problems, what are the other options? Clearly there exists a tension between local requirements and the need for shared standards (and the preference of suppliers to provide one solution to fit all). The biggest challenge, as I see it, is finding the balance between the central vision and standards and local control and flexibility. One possible strategy would be to allow local healthcare organizations to develop or purchase systems of their choice providing they adhere to some (centrally established) standards in order to enable (some level of) interoperability. Another option would be to have central software providers delivering 'standard' systems, which have a significant, in-built level of flexibility. Already the government is changing its direction a little, and allowing healthcare trusts to purchase non-core applications from other suppliers, as well as transferring accountability for the delivery of NPfIT from national to local bodies (strategic health authorities).

Ultimately, whatever the implementation strategy, the systems developed must be fundamental in supporting clinician's work practices and bring improvements to patient care. However, because information systems need time to 'bed down' (i.e. the technology has to mature and become familiar, practices need to co-evolve with the technology, and organizational structures have to adapt), the long term consequences of such systems might be different from the short-term outcomes.

V. EXPERIENCE FROM FOUR NHS ACUTE TRUSTS (Jane Hendy)

Background

My research into the UK National Programme for IT spans from the inception of the programme in October 2003 to June 2008. The research was independently undertaken under the Department of Health's Service Delivery and Organisation (SDO) programme. The project work had two main aspects. We completed a qualitative evaluation of the processes and progress made in implementing this complex change initiative. We also completed a quantitative analysis of the impact of certain e-functions being rolled out by the programme; a system for ordering pathology tests and browsing results (Computerized Physician Order Entry, CPOE) and a system for requesting radiological examinations and displaying images (Picture Archiving and Communication System, PACS). Quantitative data were gathered from inpatient and outpatient admissions and appointments in four NHS acute trust sites (six hospitals) over a period of five years (2000-5).

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[5] Incidentally, e-prescribing was the last clinical ordering module to be implemented.

Findings

When we interviewed senior trust managers and clinicians in 2004, it became clear that early implementation of the programme had been suboptimal [Hendy et al. 2005]. Poor communication between local hospital staff and programme headquarters was a major concern. Local staff felt marginalized and ignored. Unrealistic timetables combined with major financial deficits in many hospitals had led to uncertainty and low morale amongst local staff responsible for implementation. These concerns were a warning of the challenges ahead, but at that stage there was time to put things right. We recommended that programme headquarters urgently address the concerns raised in our study by revisiting their priorities—engaging staff on the front line through better communication, and engendering an improved sense of realism about the challenges ahead.

On returning to interview hospital staff two years later, we found that many of the earlier concerns voiced by local managers had gained momentum [Hendy et al. 2007]. In the intervening period, financial deficits in many NHS hospitals in England had reached crisis point [Day 2006]. The need to reduce any overspend whilst maintaining appropriate standards of care dominated managers time, leaving little time to worry about IT development. Engagement with the national IT programme was further hindered by a continued lack of communication and clarity from programme headquarters. Local staff still had no clear guidance about when the applications would be delivered, or how the costs of implementation would be met. Dates for deployment of the new systems were constantly put back, being 'never closer than two years away' [Hendy et al. 2007]. This led to increased feelings of disempowerment and frustration, and to some trusts adopting policies that actively discouraged staff from engaging with the programme—to avoid further disappointment.

Previous concerns about losing valued legacy systems were now replaced with a desperate need to have the new systems. When details of the national programme were announced in 2002, many hospitals stopped investing in IT—with the belief that the new solutions would be delivered shortly. Delays in deployment meant that by 2006 these old systems now represented an unacceptable risk to patients' safety [Hendy et al. 2007]. With doubts growing as to whether any of the promised improved systems would be forthcoming, managers considered buying interim solutions outside of the programme.

The lack of integration offered by interim solutions left staff questioning whether the long awaited goal of NHS wide connectivity, which underpinned the original vision of the national programme, would ever be achieved. The purchase of off-the-shelf interim solutions did not seem far removed from the way the NHS had acquired IT before the programme, leading managers to question what the wait had been for.

The small amount of national programme IT that was implemented during the period of our study had not, according to our interviewees, gone well. Choose and Book, a system that allows general practitioners to make patient appointments and referrals into hospital trusts electronically, was not popular among the hospital staff we spoke to. They feared that allowing patients to choose among a range of hospitals might mean that less well-performing trusts would show a downturn in referrals, and so face future closure. Early technical difficulties also undermined confidence in other future planned applications.

Despite feelings of frustration at the lack of progress, with very little new IT actually getting delivered, we found that staff remained wholeheartedly in favour of the objectives of the programme. They very much wanted a new nationwide NHS IT system, as soon as possible, but they had begun to doubt whether the national programme would ever be able to deliver it.

The financial deficits that hit many NHS hospitals in England in 2006 and the current global financial crisis help to put local NHS difficulties with IT into perspective. Tighter public finances mean the priority has to be getting the maximum benefits from NPfIT. For this to happen, further changes are needed. We tried to measure the impact of components of the national programme on measures of clinical and operational efficiency [Collin et al. 2008]. The main strength of our study was its scale and scope, which far surpassed previous studies, both in the UK and internationally. Our analysis of two IT systems (CPOE and PACS) found evidence of potentially important effects on many of our outcome measures, but these effects were difficult to interpret. We observed both beneficial and detrimental outcomes, or at least unexpected changes, so assumptions about substantial efficiency gains from healthcare IT systems supplied through the national programme seem unrealistic.

Lessons Learned

Now, five years on from the programme's inception, problems remain with delivery of the main administration and clinical support systems attached to the programme [E-Health Insider 2007]. The few trusts that have received the new administration systems have experienced substantial implementation and technical difficulties [ibid.]. Despite these problems there have been areas of great success, for example, the programme has now successfully

implemented digital x-ray systems (PACS) in all acute trusts in England. The implementation was swift and proceeded largely without problems. Even without 'hard' evidence of efficiencies, radiology services appear hugely improved.

Although the diversity of health care provision in other countries means projects on the scale of England's NPfIT are unlikely, the widespread implementation of electronic health care records in other countries is progressing [Ettelt et al. 2006]. An important lesson to emerge from our study is the difficulty in achieving an appropriate balance of responsibility between government and local healthcare organizations. Before the national IT programme, local managers had control over IT spending and development. Monies for IT were not ring-fenced (that is, guaranteed for expenditure on a particular purpose), and in times of crisis were often spent elsewhere. A lack of central guidance can also result in a lack of standards and disparate functionality. Complete control from the centre has proved equally problematic. The national programme covers the entire NHS in England. The sheer size of the task has made effective communication difficult, and so too a shared commitment to the task across all health sectors. Procurement on such a large scale has also been problematic, with the main contractors and subcontractors failing to deliver 'fit for purpose' systems [Computer Weekly 2006]. These difficulties suggest a third, middle way, might be the answer—the setting of national standards, locally implemented.

VI. TENSIONS IN THE UK NATIONAL PROGRAMME (Terry Young)

Proposed Framework

My own research and the issues raised by the other panel members suggest five tensions that offer insight into the way in which the National Programme has succeeded and been constrained. These five tensions offer an accessible means of assessing the Programme and they also provide a framework around which discussion of future such initiatives may be cast. Although described as tensions, the elements presented are not always in direct opposition. For instance, they may compete for resources or attention, rather than with one another directly. In the remainder of this section, I present some of the issues raised by the National Programme in terms of the five tensions. Then, by way of conclusion, I suggest three ways in which the framework may be applied to future large scale programmes.

The five tensions are:

1. Rhetoric-reality: The tension between what is promoted about a programme and what is actually happening.

2. Short-long term: The tension between maintaining viable, working systems and delivery processes, while migrating toward an ideal, strategic solution.

3. Local-national: The tension between moulding the system to work best for the local context, while ensuring that the national scope is maintained, along with interoperability and other standards across the nation.

4. Management-clinical: The competition for resources and attention between IT which is used to manage and control the system and information services used directly to support clinical applications.

5. Interactive-interpersonal: This tension between building healthcare information systems similar to the worlds of business and commerce in which most applications have evolved, and the need to develop new applications and services targeted at the needs of the healthcare community, particularly in terms of interpersonal communications.

The latter three tensions have been presented in a model of information provision that examines the enterprise model of IS in a healthcare context [Connell and Young 2007].

Rhetoric-Reality

In his set of papers describing the process of turning hospitals around, Jan Filochowski develops an experiential model of the evolution with time of the perception of how a hospital is doing compared to how it is really doing [Filochowski 2004a; b; c; d; e]. He notes that there is always some difference between the position articulated by those in, or managing, a hospital, and the reality of its performance. He goes on to describe the onset of catastrophe in terms of an uncharacteristically wide divergence between the two, and in the model notes, perceptively, that there will be times of inversion in the recovery cycle, when people believe the situation to be worse than it actually is.

As McGrath has already noted, there were times when such a gap was institutionalized by software consultancies. While I am not attributing such a view to the present programme, the ballooning costs from the contractual £6M plus to a prediction of something over £20M [National Audit Office 2006] raises, at least, the question as to how much of

the cost escalation was predictable and to what extent an open conversation around cost was possible ahead of time for such a highly political investment.

However, the rhetoric-reality gap has shown up in other ways, too. Given the anecdotal evidence of difficulties and emerging research findings of failure [Hendy et al. 2005], the National Audit Office (NAO) assessment of the programme in June 2006 [National Audit Office 2006] was surprisingly optimistic. It noted that the majority of the risk lay with the suppliers, because of the rigour with which the contracting had been pursued, and focused on what had been achieved, rather than what had not. The reality was that too little progress was being made against the plan and that the risk of failure (whoever held it) was too high. Reality broke through later that year when Accenture withdrew from the programme, walking away from roughly £2billion of contracts, making provision in its own accounts against losses on the Programme of around $450million and repaying £63million of the £173million it had been paid to date under the programme [NHS IT Info 2007]. In June 2007, the chief executive of the programme announced his resignation [UK Hot Views 2007] and more recently, another major supplier, Fujitsu, has parted company with the programme, although the terms of severance are unclear [King 2007].

In a field such as IS, where expectations, implementation and impact are difficult to pin down, the gap between the rhetoric and the reality can be treacherous. However, the evidence is that the underlying reality will win out in the end.

Short-Long Term

McGrath has already noted the difficulties facing clinicians as they seek to implement change. On the one hand, they try to press towards a vision of what is possible, while on the other, they face the reality of busy schedules and the urgency of patient needs. But even where the focus is entirely on the IS implementation, other forces are at work.

As Hendy has noted, the standardization involved in a national programme has created an environment in which it is difficult to manage locally developed, but high quality clinical applications. Being top down, the National Programme has no way of identifying best in class applications, reengineering them into robust, reuseable modules and distributing them throughout the rest of the system. Instead, applications were specified centrally to be rolled out. This has meant two things. Firstly, there is evidence of local managers trying to hold onto their applications—especially in view of the delays associated with clinical roll out. Second, in some cases, the NHS has lost ground as high quality applications have been displaced by inferior products.

This tension has wider, and very familiar, features. For instance, it is possible to overvalue legacy systems because we do so on the basis of the time or cost invested in them. Integration of legacy into more modern systems in order to minimize the disruption of change presents a tantalizing trade-off between short-term disbenefit and ultimate reward.

Nor has the short-term story been one of unmitigated self-denial in hopes of a better future. As other panellists have noted, England now enjoys digital X-ray systems across the country and the supporting PACS infrastructure has taken radiology a long way forward in a very short time.

As with the tension between rhetoric and reality, it is not clear how candid a discussion is really possible ahead of the event, without frightening people away from change and toward the comfort of minor work-arounds. Moreover, it is rarely possible to avoid taking the discomfort in person. I remember a discussion with a senior radiologist at a hospital in Cleveland, who had just described to me the painful process of moving to all-digital radiology. He finished the story by noting how he had gone around and unplugged all the film-based X-ray machines, forcing staff to make the move. Naively, I asked why he hadn't gotten some consultants in to help manage the process and he smiled at me: "Sometimes you have to invest your own sweat equity."

Local-National

In her description of her pharmacy study, Klecun has raised the question of whether one should even try to standardize information systems nationally. At heart, this tension is rooted in the very nature of the care system. On the one hand, people want a system that responds to local needs in optimal fashion, one that is responsive to local healthcare needs—perhaps in the face of deprivation or diversity. On the other hand, people want to avoid the inequities, for instance, of the post-code lottery, where poorer services are often available to poorer communities, or where variation leads to unacceptable care, rather than a tailored response.

In the UK, metric-driven care is an attempt to set the standards centrally, while giving local care providers freedom to craft an appropriate response. In a sense, IS ought to be ideally suited to supporting such a vision, since one of the great claims made for IT is that it takes distance out of the equation. Google and others, for instance, recognize the

benefits of offering people remote storage for their information, which is accessible locally through their browser at the click of a mouse.

In the National Programme, however, this tension is reflected not so much in terms of where data is held, but in terms of who controls the system. In fact, the design takes a fairly conservative position on data storage, with much of it being locally stored or, in some cases, stored in the local vicinity or region. However, control of the architecture and of the applications has been strongly influenced from the centre (which impacts to some extent on the next tension: management and clinical). One might argue that the use of regional contracts has standardized both the hardware and the applications regionally.

The question of what to make standard and what to customize around local needs has not really been resolved in this programme and it will be interesting to see how different processes of care delivery will evolve around the common IS being installed.

Management-Clinical

I first became aware of this issue when studying marketing reports, while I was in industry and discovered that management applications in 1997 accounted for nearly four times the volume of business represented by more clinical applications [Connell and Young 2007]. The problem is alluded to in the literature, with Benson [2002], for instance, stating, "In hospitals computing was treated as a management overhead, and doctors had no incentives to become involved."

The primacy of the management agenda over the clinical agenda has embedded itself in an interesting way as far as the National Programme is concerned, because the management systems—patient administration systems (PAS), for instance—have become the foundational systems. As Hendy has related, under NPfIT it was not possible to install the clinical systems until the PAS had been renewed. Delays were thus doubly debilitating for clinical applications.

In terms of culture, we note that IS has its roots in business systems and the enterprise and there are therefore cultural, as well as other, reasons for the agenda to swing in favour of management systems. Philosophically, this tension raises interesting questions about the relationship between empowerment and control in IS. For the present, however, we note that the management agenda is very powerful and may even take precedence over the clinical agenda, even when the system has been set up with clinical needs as the declared goal.

Interactive-Interpersonal

This final tension builds on the cultural background to most IS in business and the enterprise. A model that starts with this territory is being refined [Avison and Young 2007; Connell and Young 2007] in which we draw an 'enterprise line.' Above this line, lie the standard processes of business and commerce—records, applications, knowledge repositories, and so on. In general, it is sufficient in the world of business to interact with the data—to be able to access it, modify it, process it, share it or develop new knowledge from it. However, in healthcare, there is another, critical dimension, and this is the collegiate and interpersonal links. The consultation, for instance, is a highly interpersonal interaction—as are many others, with the community conferring, discussing, and deciding in pairs, in teams and with patients.

As Hendy has noted, some clinicians have even questioned whether the programme was going to achieve anything new. One perspective is that IS has moved out of the 'enterprise zone' assuming that the products and services that meet industrial or commercial needs are exactly the same as those needed to meet clinical needs. However, the interpersonal element of healthcare is not always well served by such solutions—especially the face-to-face element. The few products there are have very primitive capabilities (video conferencing, image transfer, and so on) and offer no processing or analytical functions around the development of knowledge or positions through the encounters. An example of a tool that might serve such a function would be a machine that would listen to a medical consultation and then provide a précis afterward (in written, spoken, or video format, as appropriate), so that the patient could review the visit afterwards and pick out the key messages—especially those that are lost in the anxiety or rush of the encounter.

While good communications are critical to superior industrial or commercial performance, the role they play in the business is, we contend, critically different from the encouragement, support, dialectic and knowledge processing evident in healthcare. Migrating to healthcare involves spilling across the 'enterprise line' into territory requiring more interpersonal IS.

While the National Programme represents a clear commitment to provide interactive services analogous to those in industry (records, booking and scheduling, prescriptions and procurement), there is no real evidence of an

emergence of toolsets to address the pressing interpersonal needs of the community. For this reason, this last tension is particularly intriguing.

Applying the Five Tensions

Major IS projects are not easy, and while the National Programme has achieved a great deal, it has also encountered its fair share of difficulties. We have presented a framework of five tensions that might support planning of the dialogue around significant endeavours of this type in healthcare:

1. Rhetoric-reality
2. Short-long term
3. Local-national
4. Management-clinical
5. Interactive-interpersonal

But how might such insights be applied? We believe there are three areas where the framework could support a significant contribution, in line with the panel discussions.

1. **Quality of the dialogue**. Major programmes involve many conversations—beforehand, during installation and in the change-management phase. The five tensions could support a more open discussion – from predicting what the costs are really going to be, to planning for the upheaval of changes in the short term against the long-term benefits. This latter, especially in conjunction with the concept of a tension between the interactive and the interpersonal, might assist in the difficult business of extracting user requirements for systems so novel that nobody has any experience of them. Overall, better dialogue should lead to better design and more appropriate implementation.

2. **Openness of negotiation**. With so many interests in healthcare, the final system will always represent trade-offs between the communities, be they management or clinical, local or central, or polarized within such groups. The tensions provide an accessible means of discussing the trade-offs and lend themselves, where necessary, to the sort of graphical methods that work in small group discussions.

3. **Genuinely cross-disciplinary processes and solutions**. While 'cross-disciplinary' is something of a buzz word, few systems have the breadth of stakeholder interests or the requirement for such a broad base of disciplines as healthcare. Apart from the many healthcare professions and sciences, there are the ethnographic and anthropological perspectives to embrace, the systems engineering, the software design, the architectural conceptualizing, and the whole to be managed. This involves a breathtaking sweep of different disciplines with their own cultures, norms and nomenclatures. Here, too, moving from the rhetoric of cross-disciplinary to the reality is a major step that few manage to complete. My own experience of working with such broad challenges for research into healthcare technology is that it takes time to bridge between the cultures, but that it is extremely rewarding when it works.

VII. CONCLUSIONS

We have examined the 'Connecting for Health' programme from a number of different perspectives. Each of us has raised issues with the current implementation and offered lessons learned and/or ways forward. We have suggested policy implications for conceptualizing, implementing and managing such programmes, ranging from advocacy of open dialogue and negotiations, a 'middle way' between national standards and local implementations and controls, and approaches to 'on the ground' implementations. We have also presented a framework of five tensions that might support the type of dialogue we advocate. Such dialogues are vital – and not just for those responsible for implementing the programme, but also for several other interested parties (e.g. patient groups, politicians, government agencies, academics, and the press) who must try to represent the views of all relevant stakeholders and the complex reality of the task at hand. Clearly, our suggestions are not exhaustive. Indeed, we have not set out to provide a comprehensive review of the NPfIT and all its parts. There is some consistency in the views expressed but also some differences, which suggests to us that they may be a good reflection of the diverse range of opinions we sought to address. In short, our contribution lies in the intensive nature of our research on this programme and the detailed insights we are able to offer on what is happening, which we hope may stimulate debate in the public interest.

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