Information Technologies in the NHS: An Observational Study of Three Acute Hospitals

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Contents

Contents ........................................................................................................................................... 3
List of tables ..................................................................................................................................... 6
Glossary of terms/abbreviations ....................................................................................................... 7
Acknowledgements ............................................................................................................................ 8
Executive Summary ........................................................................................................................... 9
Background ........................................................................................................................................ 9
Aims ..................................................................................................................................................... 9
Methods ............................................................................................................................................ 9
Results ............................................................................................................................................... 9
Conclusions ....................................................................................................................................... 10
Part One ............................................................................................................................................ 12
  1 Introduction ................................................................................................................................. 12
    1.1 Study questions ......................................................................................................................... 12
    1.2 Rationale For The Study ......................................................................................................... 13
    1.3 Organisation of the Report .................................................................................................... 15
  2 Study Design and Methods .......................................................................................................... 16
    2.1 Introduction ............................................................................................................................. 16
    2.2 Changes Made to the Protocol ............................................................................................... 16
    2.3 Literature Review .................................................................................................................... 18
    2.4 Study Design .......................................................................................................................... 19
    2.5 Methods ................................................................................................................................... 21
    2.6 Shortcomings of the Study Design ......................................................................................... 25
  3 Evidence, Theory and Policy ....................................................................................................... 26
    3.1 Introduction ............................................................................................................................. 26
    3.2 The State of Play ..................................................................................................................... 27
    3.3 The Literatures on Implementation and Use ........................................................................... 28
    3.4 Theoretical Frameworks ......................................................................................................... 30
    3.5 Network Governance .............................................................................................................. 30
    3.6 Theories of Practice ................................................................................................................. 31
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7</td>
<td>The Ecology of Technologies</td>
<td>32</td>
</tr>
<tr>
<td>3.8</td>
<td>The Policy Context</td>
<td>33</td>
</tr>
<tr>
<td>3.9</td>
<td>Concluding Comments</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>Study Background: Sites and Systems</td>
<td>36</td>
</tr>
<tr>
<td>4.1</td>
<td>The Sites</td>
<td>36</td>
</tr>
<tr>
<td>4.2</td>
<td>First Trust</td>
<td>37</td>
</tr>
<tr>
<td>4.3</td>
<td>The Patient Flow System</td>
<td>37</td>
</tr>
<tr>
<td>4.4</td>
<td>Second Trust</td>
<td>40</td>
</tr>
<tr>
<td>4.5</td>
<td>The Medicines Management System</td>
<td>42</td>
</tr>
<tr>
<td>4.6</td>
<td>The Component System</td>
<td>43</td>
</tr>
<tr>
<td>4.7</td>
<td>Third Trust</td>
<td>44</td>
</tr>
<tr>
<td>4.8</td>
<td>The Electronic Document Management System</td>
<td>45</td>
</tr>
<tr>
<td>4.9</td>
<td>Concluding Comments</td>
<td>45</td>
</tr>
<tr>
<td>5</td>
<td>Developing Systems</td>
<td>48</td>
</tr>
<tr>
<td>5.1</td>
<td>Introduction</td>
<td>48</td>
</tr>
<tr>
<td>5.2</td>
<td>Building Agreements</td>
<td>48</td>
</tr>
<tr>
<td>5.3</td>
<td>System Requirements</td>
<td>52</td>
</tr>
<tr>
<td>5.4</td>
<td>Sequencing and Integration</td>
<td>54</td>
</tr>
<tr>
<td>5.5</td>
<td>PAS, Component Systems and Integration Engines</td>
<td>56</td>
</tr>
<tr>
<td>5.6</td>
<td>The Portal</td>
<td>57</td>
</tr>
<tr>
<td>5.7</td>
<td>Moving Milestones</td>
<td>58</td>
</tr>
<tr>
<td>5.8</td>
<td>Balancing Local and Generic Requirements</td>
<td>59</td>
</tr>
<tr>
<td>5.9</td>
<td>Negotiations Continued During Implementation</td>
<td>60</td>
</tr>
<tr>
<td>5.10</td>
<td>Concluding Comments</td>
<td>62</td>
</tr>
<tr>
<td>6</td>
<td>The Governance of Projects and Strategies</td>
<td>63</td>
</tr>
<tr>
<td>6.1</td>
<td>Introduction</td>
<td>63</td>
</tr>
<tr>
<td>6.2</td>
<td>Strategic Oversight</td>
<td>63</td>
</tr>
<tr>
<td>6.3</td>
<td>Project Governance</td>
<td>64</td>
</tr>
<tr>
<td>6.4</td>
<td>Interfaces with suppliers</td>
<td>68</td>
</tr>
<tr>
<td>6.5</td>
<td>Clinical Representation</td>
<td>70</td>
</tr>
</tbody>
</table>

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List of tables

Table 1. Interviews and meetings observed at the three Trusts .................. 22
Glossary of terms/abbreviations

BMJ – British Medical Journal
BPR – Business Process Re-engineering
EDM – Electronic Document Management
EHR – Electronic Health Record
ENT – Ear Nose and Throat
EPIC – A US-based hospital IT system
EPR – Electronic Patient Record
EU – European Union
GP – General Practitioner
NAO – National Audit Office
NIHR SDO – National Institute for Health Research, Service Delivery and Organisation
NPfIT – National Programme for IT
PACS – Picture Archiving and Communication System
PAS – Patient Administration System
PDF – Portable Document Format
PRINCE – PRojects IN Controlled Environments
R&D – Research and Development
SAP – A commercial enterprise IT system
SHA – Strategic Health Authority
TIE – Trust Integration Engine
USA – United States of America
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All of the authors listed worked on the project. All except John Rooksby undertook fieldwork and analysis. John Rooksby advised on the interpretation of the more overtly technological aspects of the work of the sites.
Executive Summary

Background

This study set out to improve our understanding of the processes involved in selecting, designing and implementing information technologies (IT) in NHS hospitals in England.

Aims

We addressed three questions:

1. What is the range and size of interim shared health data projects undertaken, and why are particular systems selected for development?
2. How do informatics managers in NHS organizations reconcile the demands of clinicians, general managers and others in reaching decisions about interim IT investments?
3. How do hospitals combine systems recommended by the National Programme with systems selected to meet local priorities, or already existing systems?

Methods

We undertook case study research in three NHS hospital Trusts, using a combination of observation of meetings, interviews and analysis of documents.

The principal theoretical framework was institutional, viewing IT systems as the products of on-going negotiations between the parties involved in selection, design and implementation. This was added to in the course of the study, with two frameworks which brought the nature of the IT systems, and their effects on implementation, into sharper focus.

Results

The findings show that the sites had been developing their strategies and systems over a number of years.

They also suggest that the Trusts were clear about their general direction of travel, which involved the implementation of key new systems that the Trusts deemed important for safe and effective working, and progressive integration of new and existing systems with one another.
Equally, progress was not linear. There were extensive negotiations about systems, ranging from the broadest strategic issues down to the detailed design of individual screens on wards. IT projects involve – as the title of our report suggests – steering, negotiation and adaptation.

The wider organisational context, particularly in the shape of the Department of Health and Strategic Health Authority, had a marked influence on the thinking and actions of teams at the three sites.

### Conclusions

Our findings have implications for future research activities. We are struck by the dearth of studies of large scale IT systems in health care, given that these systems are of the most interest to policy makers. We also note the small numbers of studies which explicitly take account of the effects of technologies on behaviour.

Our experiences raise questions about the value of experimental studies of IT systems. They are ever-changing, span many settings and professional groups, and are not ‘stable’ enough to study experimentally.

For practitioners, our findings emphasise the point that the scope and scale of the challenge of modern informatics projects is easy to underestimate. Our findings offer support for the importance of leadership, communication and other pre-requisites for any successful change programme.

In IT projects additional challenges are posed by the numbers of interested parties involved in any IT project, and the inherent uncertainty about the systems that will result. Trust between the various parties is an essential pre-requisite for IT projects.

Individual NHS Trusts have, in effect, been developing their own standards, particularly for interfaces between proprietary IT systems. This seems, to us, to represent a poor use of local staff time.

We have three observations relevant to IT policy making, particularly for managers responsible for sizeable geographical patches in the new NHS arrangements:

- There is merit in agreeing explicit investment priorities. The three sites had to enter lengthy and detailed negotiations about system specifications with suppliers and other stakeholders, but they were clear in their own minds that those negotiations were worthwhile;

- Our evidence suggests that the step-wise strategy we observed at our sites is appropriate. Even though (more integrated) enterprise systems are used in other sectors, the nature of the institutional relationships in health care suggest that creating integration engines, and adding new systems over time, is more realistic for NHS Trusts at present.
• Policies on technical and data standards, particularly covering interoperability, would save a great deal of time and effort at individual NHS sites, which currently have to negotiate standards themselves.
Part One

1 Introduction

1.1 Study questions

This study set out to improve our understanding of the processes involved in selecting, designing and implementing information technologies (IT) in NHS hospitals in England.

The motivation for the study was partly academic and partly policy-driven. The academic motivation lay in the fact that there is a very large health service research literature on the effectiveness of IT, but the majority of it focuses on the effects of systems in highly localized settings such as consulting rooms or individual hospital wards. There are relatively few published studies that shed any light on two aspects of IT systems that have attracted a great deal of comment over the last decade and more – implementation and integration. The study therefore had two main aims. One was to contribute to filling in the gaps in our understanding of the implementation problems that have been noted in journal articles, official reports and in media coverage of NHS IT. The second aim was to study the deliberations and negotiations involved in developing local informatics strategies. There is a large literature on IT strategies in the business world, but surprisingly little in the way of serious analysis of strategies – how to develop them, what sorts of strategies work – for IT in health care.

There is also a number of pressing questions about NHS IT policies. There has been a substantial gap between the aspirations of policy makers and realities on the ground during the last twenty years, ever since the publication of the NHS Information Management and Technology Strategy in 1992. Why does this gap persist? Is there a problem with successive policies, or with the capacity of NHS organizations to implement systems, or does the problem lie with the IT itself? We hoped that, by studying the selection, design and implementation of informatics strategies and of individual systems, we would provide policy makers with useful insights about the 'aspiration gap'.

The main purpose of the study, therefore, was to increase our understanding of IT selection, design and implementation decisions. We undertook the research in three hospitals, using a combination of observation of meetings, interviews and analysis of documents, within a case study design. We addressed three questions:

1. What is the range and size of interim shared health data projects undertaken, and why are particular systems selected for development?
2. How do informatics managers in NHS organizations reconcile the demands of clinicians, general managers and others in reaching decisions about interim IT investments?

3. How do hospitals combine systems recommended by the National Programme with systems selected to meet local priorities, or already existing systems?

The need to address these questions was highlighted by policy developments during the course of the study. By 2008 it was clear that key elements of the main NHS IT policy, the NHS National Programme for IT (NPfIT), were unlikely to be fully implemented across the NHS in the near future. The National Programme had envisaged wholesale replacement of NHS IT systems in a 7-10 year timeframe, and NHS organizations had been instructed to cease local developments and wait for the new National Programme systems.

On the face of it, the problems with the National Programme spelled disaster for NHS IT. But the situation on the ground was not quite as bad as it appeared to commentators at the time. NHS organisations had begun IT procurement and development activity before 2008, much of it initiated because Trust Boards were pressing their informatics teams for IT support to meet short term organizational priorities. The implementation of these ‘interim’ solutions was sanctioned by a Department of Health review of health informatics published in July 2008 (Department of Health 2008). The Health Informatics Review was, in practice, the main policy that informatics teams were implementing during our field research in 2010 and early 2011.

The policy changes presented us with an opportunity. Trusts would be able to procure systems, in a way that they were not able to before 2008, and we would therefore be able to observe them. In particular, we could observe informatics managers balancing demands from clinicians who wanted systems to support service delivery, from general managers who had to pay close attention to key targets, and from Connecting for Health (whose formal responsibility was to oversee National Programme implementation, delays notwithstanding). We would, therefore, be able to study the ways in which informatics teams developed their strategies and selected and implemented new systems.

1.2 Rationale For The Study

When we started the field study, we realised that we needed to develop a strategy for observing developments in a number of different places within any one organisation – where informatics strategies were discussed, where system designs were negotiated, and where systems were implemented and used. That is, we needed to find somewhere to observe, a vantage point, in
order to understand why health care IT implementation remains difficult, but can nevertheless be achieved.

We decided to focus on the relationships between the staff groups involved in design and implementation programmes. Informatics staff would be ever-present. They are intimately involved in decisions about which systems to buy and implement. They have to write business cases to secure funding. They liaise, on IT matters, with a wide range of other stakeholders including Trust Boards, clinicians, general managers and policy makers (eg Strategic Health Authorities, Department of Health). Faced with constant demands for new and upgraded systems, managers have to decide which proposals to accept and which to delay or turn down.

Our early thinking about the design of the study was informed by two literatures, namely network governance approaches and institutionalist studies of the implementation and use of IT systems. That is, we were interested in the ways in which key interest groups negotiated with one another, with the success or failure of implementation indicating the outcome of those negotiations. (We discuss the theoretical background to the study in Chapter 3.) Teams responsible for strategies or for design and implementation had, we sensed, to reconcile the interests of four key groups of actors. The first group was policy makers. Even though key elements of the NHS National Programme for IT were seriously delayed, local informatics teams could not simply ignore it. The promised solutions were free, at least in the sense that the technologies themselves would not have to be paid for locally. In 2009, when the study started, the ministers and civil servants were still promising that solutions would arrive. Moreover, senior informatics managers had their own regional and national networks, and it was difficult for them to avoid the top-down influence of the Department of Health and the agency responsible for the National Programme, Connecting for Health.

The second group was the IT firms that provided systems to the NHS. Put simply, the firms provide the systems that NHS organizations can select or reject, and the choices available must influence investment decisions made by NHS organisations. The third group was NHS general management. Our initial discussions with the study sites suggested that the ‘interim’ IT solutions (formally called the Clinical Five, see Chapter 3) encouraged by the Health Informatics Review were important, in part, because Trust Boards had pressing needs for them. A Board might, for example, need to achieve greater control over referrals, and a new IT system may help the Trust to monitor referral patterns, and so manage them more effectively. Informatics teams might find themselves needing to find systems that help them to deliver important short term organizational objectives. Equally, these systems may present strategic problems: solving a short term problem may undermine a longer term system integration strategy. Informatics managers may, therefore, have to perform difficult balancing acts between short and long term goals.
The fourth and final group was doctors and other clinicians. It is natural for them to want better IT to support their work, and natural for local informatics managers to want to help them. But even a passing knowledge of IT literatures alerts one to the fact that clinician-informatics relationships are inter-professional relationships. Had these professions found ways of communicating with one another, or did communication difficulties help to explain the accounts of implementation difficulties?

We took the view that, if we could understand the ways in which the different groups interacted with one another, we would have a better understanding of the processes involved in the selection, design and implementation of individual systems, and in the development and execution of hospital informatics strategies.

1.3 Organisation of the Report

Chapter 2 describes the study design and the methods used in the study, and explains changes made to the original study protocol. Chapter 3 sets out broad context for the study. It describes the current ‘state of play’ with IT systems in the NHS in England, the available literature on the implementation and use of large scale IT systems, the theoretical frameworks used in the study, and the key features of current and recent IT policies. As we will see, the 2008 Health Informatics Review played an important enabling role in the hospital Trusts we studied.

Chapters 4 to 7 set out the empirical findings from our field research. Chapter 4 provides information about the three study sites, and shows that their strategies and deployment of systems developed over a period of years. Chapter 5 sets out the ways in which the sites developed their informatics strategies and selected and implemented new ‘component’ systems. Chapter 6 focuses on the formal and informal governance arrangements that the sites used to steer their work. Chapter 7 shows that the wider organisational context, particularly in the shape of the Department of Health and Strategic Health Authority, had a marked influence on the thinking and actions of teams at the three sites. Chapter 8 draws together and summarises the observations from the preceding four chapters.

Chapter 9 offers some reflections on the theoretical and policy implications of our findings. Chapter 10 summarises the lessons of the study for research, practice and policy.
2 Study Design and Methods

2.1 Introduction

This chapter sets out our study design and methods. We start with changes that were made to the study design set out in our proposal: we explain why the changes were made. The following sections set out our thinking at the start of our field research, our review of the literature, study design and methods.

2.2 Changes Made to the Protocol

Our research proposal was written in 2007, and the study was commissioned in 2008, before the second NAO report on the NHS National Programme for IT and Health Informatics Review were published. The original bid assumed that National Programme systems would be available, in at least a few localities, and that there would be opportunities to study systems as they were implemented. Even though the NHS has a history of high profile failures and delayed implementations, it also has a creditable track record in implementing IT systems, including large scale endeavours such as order communications and PAS replacements. Media reports of disasters have tended to distort the actual picture on the ground. Indeed, it seems reasonable to say that the NHS in England compares favourably with many other developed countries. It lags behind Denmark, and individual regions of Spain and some other countries, but in terms of coverage and of integration of systems England is ahead of many countries in Europe, and of most parts of the USA and of Canada.

So, even though the National Programme was running behind schedule in 2007, we felt that it was reasonable to assume that some NHS organisations would be implementing National Programme systems in 2008 and 2009, and that studies of implementation would be valuable for policy makers and for sites implementing similar systems later on. That is, the National Programme could be well behind schedule and still produce systems that we could study. We proposed to study, (i) the selection and implementation of systems, and (ii) the costs and effects of systems. The reasoning, at the outset, was that these were the two outstanding questions that policy makers needed to answer. Even though there was already a very large literature on IT in health care settings, most of it focused on the effects of IT in very limited settings, such as individual clinics or wards. There was very little convincing evidence that shed light on the reasons why implementation was so often difficult, or about the larger scale costs and effects of such systems (eg across a number of clinics, or across the primary-secondary care boundary).
There were three components in our original plan of investigation:

1. Study 1 – An observational qualitative study of the implementation of shared electronic patient records across services for older people;

2. Study 2 – A study of the cost-effectiveness of shared electronic services used in coordinating hospital discharge for older people focused particularly on stroke services. This comprised:
   - a conventional cost effectiveness analysis, and
   - a qualitative study of change in the co-ordination of care processes to complement this analysis;

3. Study 3 – Quantitative evaluation of the implementation of shared electronic patient records in diabetes services across NHS organizations in Yorkshire and Humber SHA.

In the event, even our minimal expectations about the NHS National Programme for IT were not met. We undertook a literature search focused on recent policy and practice for IT in the NHS, including reliable reports of implementations of National Programme and other systems. The search focused both on the overall progress made with the National Programme for IT (NPfIT) and also the services specified in the original research design, namely stroke, discharge planning and diabetes care. The results gave us grounds for concern about progress with the Programme, and an NAO report published in May 2008 confirmed that progress was far slower than anticipated. We also visited a number of NHS senior informatics managers and clinicians to discuss our research plans. It soon became clear that, as our reading of the literature suggested, the National Programme for IT had not progressed at the rate we had originally envisaged. We realised that the National Programme systems that we needed would not be available. This meant, in particular, that the original plans for Studies 1 and 2a – where we had hoped to investigate these national IT developments in the context of discharge planning and stroke services - were no longer possible. We would have to re-visit our assumptions about the study, and re-design it.

With the benefit of hindsight, the decision to re-think was the right one. The centrepiece systems, integrated electronic patient records, have only been implemented in a small proportion of NHS organisations at the time of writing, three years later\(^3\).\(^4\).

More positively, our literature search and initial meetings suggested that there were large numbers of IT initiatives being developed separately from the National Programme. And, in mid 2008, we believed that we could still undertake Study 1 and also Study 3, a network analysis of the use of diabetes systems. The starting point for a revised study was a new Department of Health policy, the Health Informatics Review\(^5\), published in July 2008. The report restored the authority to make investment decisions to NHS Trusts, and allowed then to select and implement their own ‘interim systems’. Policy makers recognised that organisations needed to implement systems to address pressing clinical and management
requirements, and that key National Programme systems might not be available for some years, so that the sensible way forward was to implement systems to bridge the time gap between 2008 and the arrival of National Programme systems.

The fact that sites were actively considering ‘interim solutions’, and had the green light from the Department of Health to implement them, meant that Study 1 could go ahead. It was agreed with NIHR SDO that Study 1 would be combined with Study 2b into a single study design, and this is the study described in Chapter 3.

We were not so fortunate with Study 3. We negotiated with NHS colleagues about access to quantitative datasets during 2008 and 2009, believing that it would be practicable, and worthwhile, to evaluate the impact of new ‘templates’ for use during diabetes clinics in a number of localities. By the end of 2009 it was becoming clear that we were unlikely to obtain a useful dataset, in spite of the efforts of the NHS colleagues. Eventually, we concluded that Study 3 could not be delivered, and we agreed with NIHR SDO managers that the study should be dropped from our programme.

The result of the changes was that one substantive study went ahead, and that is the one presented in this report.

2.3 Literature Review

There have been a number of useful reviews of the literature on the implementation and use of information technologies. The single most useful review, for this study, is reported by Potts and colleagues (NIHR SDO 08-1602-131). This is a meta-narrative review of studies of electronic patient records systems. A meta-narrative review identifies the different academic traditions used to study a phenomenon of interest – electronic health records in this case – and highlights the different assumptions made by people working in each tradition, and the empirical evidence generated within each one. It is thus possible to review both the assumptions and the available evidence.

Electronic records systems are relevant to us because they are used by several professional groups or organisational units. That is, many of the systems discussed require a number of distinct groups to work together. As a result, they are likely to have posed similar organisational challenges to those encountered in our study sites.

Potts and colleagues’ review provides us with two valuable insights. The first concerns the different traditions themselves. Nine main traditions are presented in the review, which range from the experimental to the constructivist. Our research questions led us towards some traditions and away from others. Of those presented, our approach is closest to the technology-in-practice approach pioneered by Orlikowski and colleagues. Other approaches are less relevant to the current study, either because
they are designed to address a very different type of research question (e.g., randomised controlled trials), because we do not possess the necessary skills (e.g., critical sociology), or because they focus on smaller scale settings than the current study (e.g., computer supported co-operative work). This said, we found it necessary to draw on other literatures in the course of the study, and explain our reasoning in Chapter 3.

The second insight concerns the substantive literatures that are relevant to our study—those that shed light on the relationships set out in the last section, and the ways in which those relationships shape, and are shaped by, the technologies they are implementing. The results of the meta-narrative review are striking, in that few papers cited are of studies undertaken in health care settings (anywhere in the world). In order to check this result, and to find any papers that the study team might have omitted—perhaps because they were undertaken in traditions not covered by the review, or were published after the review process was finished—we undertook our own searches. Our searches included broadly based searches using Ovid—which includes Medline—using terms such as hospital and information technologies. We also set up alerts for, and reviewed the contents of, a small number of journals (e.g., the BMJ, MIS Quarterly, and Health Affairs, which has published policy-oriented articles on IT developments in the USA).

Searches for observational studies of large scale implementation programmes, or of systems in use, produced modest returns. Most papers were, perhaps unsurprisingly, reports of experimental studies, or observational studies of small scale settings (e.g., consultations), or commentaries containing little or no empirical evidence. Often, comments on the difficulties of implementation would be discussed briefly at the end of a paper, which focused mainly on the technical performance of a system or on its clinical effectiveness. Or, in common with the meta-narrative reviewers, we felt that articles made claims about the benefits of IT systems but did not back these up with evidence. We felt that we could not draw upon most of these papers. Our results therefore broadly support those of Potts and colleagues. Accordingly, in Chapter 3 we briefly review a small number of relevant empirical papers, and note a similarly small number of more theoretical contributions which helped us with our thinking during the study.

2.4 Study Design

This study focused on the design and deployment of interim electronic services in three acute hospitals. We used a prospective case study design. There are many different types of case study, ranging from Yin’s scientific approach to the more naturalistic approaches advocated by George & Bennett and others. Our approach was at the naturalistic end of spectrum, principally because we believed that the only way to understand implementation was to spend time observing the people doing the
implementing\(^7\). The literature suggested that implementation was unlikely to proceed in a predictable, linear fashion, and the field research should therefore focus on the unfolding stories at one or more study sites. There would not be any opportunities to construct a quasi-experimental design, of sites undertaking the same activities at the same time, or to test specific hypotheses about the selection or implementation of systems.

Two decisions led us to conduct a case study, rather than an ethnography or other observational study. The first was the decision to ask two types of question in parallel. The first were specific to the hospitals—these are the main study questions set out in Chapter 1. The second type of question was more general—what do the experiences of the hospitals tell us about the prospects for the implementation of new systems and for system integration? It could be argued that this twin strategy, identifying an empirical with a more theoretical question, is a defining characteristic of all well designed case studies\(^8\).

The ‘twin question’ decision led to two features of the study design. It informed a further decision, to use two ‘lenses’, set at different levels of resolution, to study the sites. One lens focused on the implementation of a single system in each site, while the other was set to take in the hospitals’ informatics strategies. It was as if we were hovering over the sites at two different heights, with the intention of capturing accounts at both heights and using each to interpret, and confirm, the other. We also compared the accounts of developments at each site with one another: we wanted to both have confidence in our accounts of each site, and also confidence in any common themes that emerged across the three.

The second decision was to combine two analytical strategies, which (after Hammond 1996) we can call correspondence and coherence strategies. A correspondence test is one where the truth or falsity of a claim is judged against the available evidence. For example, the claim that a new IT system is being used by all staff on a ward can be tested empirically. In a coherence test, in contrast, the internal logic of a claim is tested: if the arguments make sense then the claim might be true. The point of using these two slightly arcane terms is that they shed light on the process of arriving at the truth about some or other situation.

What does this mean in practice? Suppose that our sites made good progress with implementation over 12 months, but had their fair share of challenges and disappointments too. It would be possible to analyse our data by looking for themes, which might include the importance of maintaining good relationships with IT suppliers, keeping Trust Boards informed of developments, and so on. This might produce an interesting report, but it would be difficult to know how far the experiences at the study sites might be replicated elsewhere. It might also encourage naïve conclusions, eg if staff shortages were an issue, increasing staff numbers might help.
To continue with this last example, suppose that there were indeed shortages of key informatics staff in all three sites. But observations showed that, in spite of this, sites were still able to make progress with implementation. They might do this by co-opting clinical staff with particular interests in IT, or leaning on suppliers, or employing temporary specialist staff, to do work that they were unable to do themselves. Case study methods – at least at the more naturalistic end of the spectrum - offer strategies for identifying the best overall ‘fit’ with all of the available facts, where the evidence fits together in a single, coherent account of developments. Thus the more rounded conclusion, in the case of staffing, might be that there were indeed staffing problems, but that organisations found ways of working round them.

Coherence accounts are important because they are the starting point for theory development. George and Bennett⁹ argue that:

“An important advantage of typological theorising is that it can move beyond earlier debates between structural and agent-centred theories by including within a single typological framework hypotheses on mechanisms leading from agents to structures and those leading from structures to agents. This allows the theorist to address questions of how different kinds of agents … behave in and change various kinds of structures.”

2.5 Methods

We began the process of identifying study sites by consulting with informatics leads at the SHA. They were able to provide us with an overview of the implementation plans of the acute Trusts across the SHA area (which covered the maximum distance we could realistically travel to undertake fieldwork). This allowed us to identify a shortlist of sites, and we approached five in total, and spoke to the head of informatics at each one. They were able to tell us what systems they intended to implement during 2010, the period of the study. These conversations gave us our three sites, with one declining to be involved and the other not having any suitable systems ‘in the pipeline’ at the time. The research team met key representatives from the three sites, re-establishing links to key managers created before the ethics and R&D process, which took 4-6 months (ie the time taken to receive R&D approval varied from site to site). Through these ‘gatekeepers’ it was possible to gain an initial understanding of the work being undertaken at each site, and discuss the practicalities of the research, assuming that ethics approval could be obtained¹⁰ ¹¹.

The next step was to obtain ethical and research and development (R&D) approval for the study. The process included the preparation of a letter that would be sent to study participants (see Appendix 1), a staff consent form
(Appendix 2), a study information sheet (Appendix 3) and a topic guide (Appendix 4). Research ethics committee approval for the study was granted in the autumn of 2009 (see Appendix 5). We were advised, in early 2010, that we should also apply for NHS R&D Portfolio status, but the status of our application was not resolved before the end of the fieldwork period.

At the start of the fieldwork phase of the study, the researchers met key representatives from the three sites again, re-establishing links created before the ethics and R&D process, which had taken 4–6 months in total (the time taken to receive R&D approval varied from site to site, and was not under the control of the research team). We attended project board meetings, and were formally introduced to NHS staff centrally involved in some of the activities we wanted to observe. We also attended a regular team meeting of each individual project we wanted to observe, again in order to introduce ourselves to key NHS staff.

In each site we followed, (i) the progress of one system that was being implemented and, (ii) the ways in which the hospitals’ informatics strategies were developed and used. The fieldwork was undertaken over 12 months, during the calendar year 2010. We observed meetings, interviewed staff and analysed documents. These standard methods have been used singly and in combination in studies of electronic patient records and other electronic services\textsuperscript{12, 13, 14, 15, 16, 17}.

We did not talk to patients or view individual patient records at any point during our work. The numbers of interviews and meetings observed are shown in Table 1.

Table 1 Interviews and meetings observed at the three Trusts

<table>
<thead>
<tr>
<th>Site</th>
<th>Number of interviews</th>
<th>Number of observations of meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trust</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Second Trust</td>
<td>9</td>
<td>28</td>
</tr>
<tr>
<td>Third Trust</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Totals</td>
<td>28</td>
<td>69</td>
</tr>
</tbody>
</table>
Meetings were observed to capture the ways in which decisions were negotiated, discussed and communicated. We attended selected regular meetings as appropriate to each site, including Project Boards, Implementation Teams, Informatics Boards and Clinical Advisory Groups. Some key strategic meetings were held quarterly, and we attended as many of those as possible. We attended a number of monthly meetings of both programme boards – with oversight of informatics activities – and of the specific projects we were observing, throughout the 12 month fieldwork period. A number of one-off planning meetings, product demonstrations and training sessions were also observed. Care was taken to not disrupt the meetings by arriving late or leaving early, or interceding in the business of the event.

We asked for, and were given, a wide range of documentary material. In addition to the documents linked to the meetings, we collected comprehensive documentary material, including IT strategies, business cases, minutes, scoping exercises, project initiation documents, audit reports and progress reports. Managers were particularly helpful in identifying documents that were relevant, and added the researchers to a number of relevant mailing lists. All documents were examined to increase our understanding of the background to, and the processes involved in, the decisions being taken.

Face-to-face interviews were conducted with purposively selected key individuals, partly to complement data obtained from meetings, but also to elicit the private views of individual participants, which might not be articulated in meetings. Interviewees were selected to give us an overview of both strategic thinking and the more detailed planning and negotiation involved in each IT project. Thus most of our interviews were with staff in one of four broad categories - directors of informatics, members of informatics teams, project leads and key clinicians.

The interviews were semi-structured, based on topic guides developed by the research team, and using an iterative process which continued throughout the research process, building on what was learned in the early stages of observation (see Appendix 6 for an example of a topic guide used for a late interview, in month 11 of the 12 month study). The interviews included staff responsible for implementing the projects, members of informatics teams, medical, nursing and other clinicians, Trust and general managers and administrative and clerical staff. Audio recordings were made with the permission of participants and were transcribed verbatim to ensure accuracy.

The team developed detailed accounts of the implementation processes in each hospital, drawing on all of the data sources, highlighting the ways in which decisions were arrived at, and how problems were solved (or how satisfactory solutions could not be found). Draft reports were produced for each of the three sites, for use within the research team. These site reports were divided into four areas of interest:
- The historical background to informatics developments
- Negotiations and actions directly connected with the design and implementation of systems that took place during the year;
- The formal and informal governance arrangements that were used to bring stakeholders together;
- The wider organisational context for the work of the three sites, including direct contacts with SHA and Department of Health staff, and more generally, the ways in which national policies were interpreted locally.

The reports provided the material for working up coherence accounts for each site, with that account being as consistent as possible with the data we had collected. The individual site reports allowed us to compare and contrast experiences at the three hospitals, and the results of that process are presented in the next four chapters. We discussed our emerging accounts, as we drafted them, during the last third of the study period (i.e. from late in the field research phase, in late 2010, into early 2011). The site accounts were used as the basis for the findings reported in Chapters 4-7.

The essence of the approach set out in Section 2.4 lies in turning thematic accounts – listed by engagement with suppliers, senior management support and so on – into coherence accounts, where the themes are part of an integrated account of developments across the three sites. The established way to do this in case studies, used since classic American studies in the 1970’s, is to develop a narrative account. The technical argument here is that the narrative that emerges has passed two important ‘tests’, namely of correspondence with the available data, and coherence, where the overall account makes sense – where the themes fit together into a coherent whole.

There is usually a further ‘test’ of the coherence account, namely the extent of agreement with published high quality studies. As we have already noted, comparison of our emerging findings with the relevant literature led us to believe that parts of our account were reasonable, in the sense that they were broadly consistent with one or other strand in the literature. At the same time, and as we will explain in Chapter 3, we came to realise that our study – in common with well regarded published studies – risked focusing on the people working on projects and programmes alone, at the expense of the systems that they were implementing. That is, we risked omitting the effects of the systems on the programmes and projects. For example, if a project team wanted a system to include a particular function, and this could not be included in the design, this would have a material effect on the project team’s deliberations. Chapter 9 is our response to this problem, where we set out an account told – as it were – from the point of view of the systems, rather than of the people working in programmes and projects.

The draft report was sent to the sites for formal clearance, including checking of the acceptability of using quotes, the accuracy of our detailed
observations, and the credibility of our overall accounts. This is the familiar process of member checking – checking that those involved in the programmes and projects recognised the account. The report was cleared with all three sites.

2.6 Shortcomings of the Study Design

There are inevitably weaknesses in the study design, which mean that our findings need to be treated cautiously. The weaknesses can be traced to our methods, site selection and theoretical frameworks:

- The methods set out above show that we used a number of strategies to maximise our confidence in our findings (what some would term internal validity), but it is difficult to evaluate their generalisability. This study is usefully viewed as a contribution to the literature on implementation of large scale IT systems.

- The research was undertaken at three purposively selected sites. It is possible that a study at three sites in another part of England (in another SHA) or another country would have produced different results.

- As we explain in Chapter 3, we started the study using established institutional frameworks. We came to realise in the course of the study that our approach was incomplete, because our frameworks understated the importance of understanding the technologies involved – or, to be more precise, the ways in which those technologies influenced the behaviour of the project teams and other interested parties. We have sought to address this point, particularly in Chapter 9, but the findings reported in Chapters 4-8 should be read in the light of our appreciation of our omission. Indeed, recognising the importance of studying technologies as well as the organisational processes could be viewed as a learning point from this study.
3 Evidence, Theory and Policy

3.1 Introduction

In this chapter, we set out the broad context for the research study. We assumed, when we started the study, that we would be able to find descriptions of the systems used in English hospitals, and in hospitals in other countries. A good description of the current ‘state of play’ would allow us to identify appropriate systems to study: we would, for example, be able to judge which current developments were strategically important, and which interesting but of limited interest to managers or policy makers. It would also allow us to judge the extent to which the hospitals we were studying were typical of other hospitals in England. Our assumption proved to be misplaced: it is difficult to find good descriptions, in England or anywhere else. Accordingly, we start this Chapter by summarising the ‘state of play’, as a backdrop to the empirical study.

The following section sets out the available academic evidence about the implementation and use of IT systems in health care. As we noted in Chapter 2, there is a relatively small academic literature that bears directly on the three main study questions. The next section introduces the theoretical frameworks that were used in the course of the study. This study was conducted within a broad ‘new institutional’ framework. As we will explain, institutional approaches tend to ignore IT – they just don’t talk about it at all - and this created conceptual challenges in both the design of our study and in the interpretation of our findings.

Finally in this chapter, we set out the main current and recent IT policies for the NHS in England. The NHS is emerging from a turbulent period, starting with the announcement of the NHS National Programme for IT in 2002, and its well-publicised problems over the intervening nine years, particularly relating to the delivery of integrated records systems. Since 2008, with the announcement of the Department of Health’s Health Informatics Review, the NHS has in effect had two separate national IT policies.

Our aim here is not to critique policies. The value of policies, in this study, is that they help us to identify objectives – that is, to understand what policy makers believe digital services are for. If we can understand what policy makers want to achieve, and the extent to which hospitals and other organisations are able to achieve those objectives, then we will be in a position to comment on the kinds of policies that might encourage successful implementation and use in the future.
3.2 The State of Play

We imagined, at the start of the study, that we would be able to construct a ‘map’ of implemented systems, and use it to work out what types of systems are successfully implemented, what types fail, and which systems pose the greatest implementation challenges. We discovered that it is difficult to establish how hospitals across England, or most other countries, are faring.

It is, though, possible to make some general observations about developments over the last few years, which seem to be broadly similar across English acute hospital Trusts. On the positive side, the majority of NHS hospitals are now heavily computerised, in the sense that there are systems in most wards and departments, and increasingly also links with primary and community care services. All acute hospitals have patient administration systems, and as far as we are able to tell a majority now have order communications systems. IT systems are indispensible for back office functions including finance and workforce planning. Outside the hospital, computerisation of general practice is now extensive. A majority of GPs are able to ‘view’ pathology results remotely, and GPs and patients can make appointment bookings. In some places community nurses also have access to patients’ hospital records, including records of recent pathology tests.

Less positively, nurses are the largest single group of health professionals, and yet many hospital (and community) nurses are still reliant on paper. It remains difficult to access many systems remotely, including hospital systems containing key patient data such as radiologists’ reports on the images they review. In telemedicine, in spite of the technological improvements and reductions in costs in recent years, the take-up of applications in clinical practice, such as holding ‘electronic clinics’ that save patients journeys to hospital, has been slow and is still limited.

In order to make sense of these developments – so that we do not just generate lists of successful and failed systems - it is useful to identify trends in the diffusion of systems over time. There appear to be two general trends over the last 10-15 years, namely an increase in coverage of digital services and system integration. First, the history of individual systems – which we can usefully think of as components of larger scale systems here – is one of large numbers of initiatives, many of which have grown up in a piecemeal way, often driven by committed clinicians, or by supplier firms which have been able to develop systems that particular groups value. There appear to be three broad diffusion patterns for these ‘component’ systems:

1. Extensive diffusion within any one department, with limited links to other systems outside that department, eg systems used in operating theatres or emergency departments, or networked, but still dedicated, applications such as pathology results reporting systems;
2. ‘Polynesian’ patterns of diffusion. Systems are used in a relatively small number of acute Trusts, scattered across England. Systems developed ‘in house’, such as some medicines reconciliation systems, are examples of this pattern.\textsuperscript{21}

3. No diffusion. Some technologies have never progressed beyond the research and development phase. Many decision support systems have not progressed beyond the pilot stage.\textsuperscript{22}

The second general trend, which has been particularly evident in the last five years, has been an increase in integration programmes. This trend is concerned with linking several component systems, including the ‘dedicated, networked’ systems together. The policy context in England is important here (see section 3.8 below). The main motivating idea is that clinicians in one part of a hospital need access to information generated elsewhere – information about surgery is needed on a ward, information about treatment in accident and emergency is needed in an out-patient clinic a week later, and so on. This can only be achieved by linking systems together, so that information from a departmental system can be viewed across a hospital.

Just as it is difficult to establish the extent of integration systems in England, so it is in other countries. HIMSS Analytics data (http://www.himssanalytics.org/) suggest that many countries are making progress with implementation of hospital-wide systems such as order communications, but few hospitals in any country have recognisable records systems – that is, systems that indicate extensive integration. Other reports from the USA suggest that between 20\% and 40\% of hospitals have enterprise systems, such as EPIC.\textsuperscript{23} As far as we are able to judge, England appears to be somewhere in the middle of the range, behind Denmark and regions of some other countries, but ahead of others.

### 3.3 The Literatures on Implementation and Use

In Chapter 2 we reported that the SDO-funded meta-narrative review of electronic patient record systems had provided us with valuable material (08-1602-131). The current study does not focus on electronic patient records, but some of the review’s observations are relevant to this study. The review states:

“\textit{There is good evidence that the use of e-Health technologies is leading to changes in the organisation and delivery of health services. Changes are occurring in the organisation of patient care in both specific clinical settings and in the ways in which patient care is managed across organisational boundaries. Equally, there is evidence that new services can be introduced without discernible benefits and some authors criticise visions of a technological utopia. They argue that ‘failed’ programmes are common and even ‘successful’ initiatives are plagued by delays, escalation of costs, scope creep, and technical problems.}”

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This highlights a key characteristic of information technologies that distinguishes them from some other health technologies: benefits do not automatically arise following implementation, but are only observed if the behaviour of users changes. Interventions are a combination of technology and organisation.” (Page 11)

Over the above the meta-narrative review, there is useful evidence about experiences of design and implementation processes involving large scale systems in health care settings. There are few convincing accounts of implementation of large scale systems, but one exception is VistA, which was developed in, and is across, the Veteran’s Administration system in the USA. Independent assessment of the system suggests that the system is very well designed from a software engineering point of view. The success appears to have been built on open, trusting relationships between informatics teams, clinicians and managers. The system is being continuously refined, and the refinements are agreed through discussion and debate. Other accounts emphasise the difficulties encountered during implementation. For example, Hartwood and colleagues studied the implementation of an electronic health record system in England. This study emphasises the developmental nature of the project, which involved a great deal of discussion and reflection about the design of systems, and negotiation with a range of stakeholders that precedes, and continues during, implementation. Technology solutions are not often, it seems, straightforward ‘off-the-shelf’ technologies.

Moving from development to use, reports by Tjora and colleagues of the frustrations of using (supposedly) integrated systems in clinical environments, which do not ‘fit’ clinicians’ working practices (eg recognise the time pressures they work under, for example by ensuring rapid and simple logging into systems), point in the same direction. Even when systems are deemed to have been successfully implemented, users may have to work out how to adapt the systems, or their own working practices, to one another. The accommodation may only be partial. The picture that emerges is far from the ideal that IT advocates imagine, where the technology is perfectly integrated with people’s work patterns. It is, rather, a story of accommodation, and of staff exploiting useful features of a new system but having to put up with or work round features that simply cannot be adapted to local practices.

These findings are broadly supported by work in other sectors, for example by Orlikowski and Ciborra and Hanseth, who emphasise the exploratory nature of many implementations in industrial firms, insurance and elsewhere. Pollock and Williams provide a detailed account of the way in which SAP, the software firm, developed their suite of ‘back office’ systems over a 20 year period. This suggests a potentially useful interpretation of system implementation. This study showed that the company, SAP, has to balance its own preference for standardised systems – which is commercially sensible for the company – with users’ desire for highly tailored solutions. Adding the firm’s perspective to the account helps
us to see that ‘good enough’ solutions, involving staff finding workarounds when the technology does not fit work patterns, might be an expected outcome. There is a limit to the extent of the tailoring to any one organisation’s requirements.

This small collection of helpful papers broadly supports the findings of the meta-narrative review. That is, they confirm the view that interventions are a combination of technology and organisation, and that implementation is often difficult, though it can be achieved.

3.4 Theoretical Frameworks

In the course of the study we drew upon three distinct literatures, and outline each of them in this section. The first literature, on network governance, influenced our study design and methods. The significance of the second and third only became evident midway through the study. The second, theories of practice, became the main theoretical framework for the study. The third literature, on technology innovation, influenced our interpretation of our findings – specifically, it informs our reflections in Chapter 9.

3.5 Network Governance

Many researchers interested in organizations and institutions view them as governance networks. The basic idea is that institutional life is characterised by networks of tightly and loosely coupled relationships, linked together in a network of diverse actors, where power is unevenly distributed, and relationships are continuously negotiated. The network is the product of those negotiations. There are a number of different ‘flavours’ of network governance, including theories of democratic network governance and the New Public Governance. Our study used these ideas, on the basis that a number of interest groups would be involved at each stage of the selection and deployment of a new system, or in the development of a local informatics strategy. We were interested in the ongoing relationships between the various groups, and the ways in which negotiations between them influenced the hospitals’ systems and strategies.

There is, though, a problem with this literature. It concentrates on the social relationships between various groups, and the most widely cited authors are silent about the role of information technologies. Writers such as Lips, Lofgren and Schuppan are exceptions to this general rule, but they focus on topics that our outside the scope of our study (eg involving communities in democratic deliberations using electronic media). The need to include IT in theories been made most forcefully by Dunleavy and colleagues, who argue that institutional and other theories of public services that omit digital networks are, at best, incomplete. They propose that explicit account should be taken of the role of digital networks in shaping the services that, increasingly, depend on them. Nevertheless, network
governance concepts proved to be helpful to us, because it prompted a way of thinking about IT implementation. We speculated that the IT systems that emerged would, in effect, be the result of the negotiations between the different groups.

### 3.6 Theories of Practice

When we began reading of political science and sociological accounts of IT implementation and use, we found a small number of theoretical books and papers that were relevant to our study. Authors included Orlikowski, Ciborra, Hanseth, and Pollock and Williams. These, and others whose work they cited, start from the observation that we have a relatively poor understanding of the relationships between institutions and information technologies. The problem is usefully set out by Orlikowski (in Feldman and Orlikowski 2011):

> *These theories [theories in vogue in the 1980’s] assumed that the technology that was planned and designed would be built, that the technology that was built would be used in particular ways, and that the technology that was used would produce specific anticipated and intended outcomes. But as my colleagues and I had discovered, not only could we not guarantee a perfect translation of requirement specifications to running code, we had no control over whether and how others would use the technology that we had built (both in the short term as well as over time), and we certainly had no way of knowing or anticipating the range of possible unintended consequences that might attend a technology’s use in practice and over time.*

*Missing from these dominant models of technology was the recognition that technology is not valuable, meaningful, or consequential by itself; it only becomes so when people actually engage with it in practice.* [page 1246]

Orlikowski explains how she found some theoretical frameworks – notably Gidden’s theory of structuration – valuable. But she eventually came to appreciate the value of the theories of practice literature in understanding information technologies:

> *As humans interact with technological artifacts they constitute a technology-in-practice through their recurrent use of the technologies. However, their actions are at the same time shaped by the technologies-in-practice they have enacted in the past. Thus, in their ongoing and situated action, actors draw on structures that have been previously enacted (both technologies-in-practice and other structures) and in such action reconstitute those structures.* [page 1247]

This perspective, which emphasises the continuous interplay between technologies and the people who develop and use them, usefully complements the network governance perspective. Network governance concepts suggest that we should focus on the negotiations between
different groups, because the negotiations would substantially influence the outcome – in this case, the IT systems being designed and implemented. The theory of practice perspective also highlights the idea that social processes influence the design and use of a technology, but in addition proposes that the technologies in turn influence the social processes.

We can extend the arguments here, to think about what actually happens to large scale systems as a result of these on-going interactions. All of the writers in this broad area agree that, except for the simplest applications (such as email) it is impossible to specify the design of a technology fully in advance, or predict how it will be used. The design of a technology and the way it is used will, rather, emerge from the negotiations between interested parties. Those negotiations are influenced by the technologies themselves. Ciborra argues that, in any large project, the result of these negotiations is what he calls drift. Teams start with objectives for a system, but issues arise in the course of development, adjustments have to be made, and the result is a system that does not do what its sponsors want. Pollock and Williams argue that this view is too negative, and ignores the fact that some large scale systems have been successfully implemented. Citing evidence about a widely used ‘back office’ system, SAP, they point out that it has been successfully implemented in many sectors, and in many countries, around the world. The ‘fit’ with administrative processes is often sub-optimal, and users find ‘workrounds’ that allow them carry out their work efficiently. But the broader point is that SAP successfully supports a wide range of administrative activities, just as those purchasing the system anticipated. In the case of SAP and other systems the drift is, at most, limited.

3.7 The Ecology of Technologies

The third literature is really a single text, but one which influenced our thinking as we analysed our empirical data. Brian Arthur argues that many of us have been thinking the wrong way about IT and other technologies, and this is because we have misunderstood another problem – the nature of innovation. The standard view is, roughly, that new products or services are developed in a particular setting, and are likely to diffuse through organisations or markets if the price is right, and there is a receptive audience. The rapid uptake of mobile telephones, and the services that can be accessed via them, are a good example.

Arthur argues that this explanation, while basically correct, is incomplete. He believes that economies encounter new bodies of technology rather than adopt them, and new combinations of technologies result. He gives the example of the banking industry encountering computation in the 1960's. Activities drawn from banking, such as accounting procedures, merged with some known computing approaches, notably data entry procedures and certain numerical and text processing algorithms. When brought together these created new functionalities, which we might term digitalised
accounting. The result was a commingling of procedures from banking with procedures from computation that created new processes formed by combinations drawn from both. Such commingling is, he argues, true of all ‘adoptions’.

Typically, as domains evolve, the understanding of problems deepens, technologies develop, and practices using those technologies become firmly established. Elements of technologies that function poorly or are missing (he cites Thomas Hughes’ concept of reverse salients\(^3\)) are worked on. When solutions are found, they can have commercial implications: the commercial potential of mobile computing services in the health domain comes to mind.

Viewing the ‘digital landscape’ sketched in Section 3.2 in the light of Arthur’s arguments, we might speculate that health care is a domain where encounters with information technologies are difficult. Progress has been made, but more slowly than other sectors. It may be that health care does not lend itself to computerisation, perhaps because it is difficult to coordinate design and implementation when several groups of professionals are involved. That is, the logic of IT integration is that clinical teams are ready and willing to work together, and in particular to standardise their working practices – and this is not the case in practice. Or, it may be that medicine is inherently difficult to automate. That is, while it is possible to capture some information electronically – prescriptions, pathology results – much of medicine involves uncertainty, shades of grey. The parallel with banking would therefore be misleading. As we discuss in Chapter 9, Arthur’s work influenced our interpretation of our results, because his arguments, applied to health care, raise the possibility that extensive, successful implementation is by no means inevitable. Rather than thinking only about the success – or otherwise – of implementations, we should be asking whether we currently have information technologies that mesh effectively with clinical work.

In summary, this section has set out three different theoretical frameworks, each of which we drew on in the study design or the analysis of our findings. The literature on network governance provides the broad backdrop to the study. The literatures on theories of practice and encounters with technologies help to sharpen our thinking about the interactions between people and technologies. The second and third literatures, in particular, influenced our analysis and interpretation of our findings.

### 3.8 The Policy Context

In Part Two of this report we will show that, in deciding on which systems to implement, and in designing them, the three study sites took many of their cues from senior managers and from clinicians within their Trusts. They did so, though, in the context of national IT policies. In this section we briefly
outline the two main NHS IT policies in force at the time of the fieldwork, in 2010.

The first policy was the NHS National Programme for IT. The National Programme was designed to provide enterprise systems for hospitals. That is, existing hospital systems would be scrapped, and new hospital-wide systems supplied by single vendors would take their place. These new enterprise systems would undertake a number of basic functions, including those undertaken by patient administration and order communication systems in place at the time.\(^{38}\)

The National Programme was based on three key ideas. The first rested on the observation that, historically, funding had been inadequate and there had been weaknesses in procurement (Brennan 2005\(^ {39}\), Department of Health 2002). The second was that IT contractors would have the knowledge and skills needed to deliver the Programme. The NHS would be the beneficiary of private sector expertise. The third idea was that large scale IT networks would bring more control of doctors and other clinicians. That is, IT was part of a longer-running and broader story, of civil servants’ desire to bring the ways in which doctors and others committed NHS resources under greater control. These beliefs led the Department of Health to strike large\(^ {40}\), long term and tightly defined contracts with suppliers.

In the event some elements of the Programme were implemented successfully, but key systems were not delivered on schedule. Indeed, key hospital systems have only been implemented at a small number of Trusts at the time of writing this report. Three NAO reports and subsequent Public Accounts Committee hearings (in 2006, 2008 and 2011) documented the delays. The Chief Executive of the NHS acknowledged that the Programme was far more complex than he or other senior officials had expected.\(^ {41}\)

On the ground, NHS organisations initially did as instructed, and waited for new systems. But by the middle of decade the patience of Trust Boards and informatics teams was wearing thin. Having been promised new ‘base’ systems, such as patient administration systems – many of which were already ageing at the start of the Programme - some hospitals decided to procure their own systems. In 2008 the Department of Health came to a similar conclusion and published a new policy, the Health Informatics Review. The policy was more ‘bottom-up’ and incremental, and explicitly focused on hospitals, where the need for new systems seemed to be greatest.

The National Programme continued, but endorsed the procurement of a wider range of systems than it had in previous years. From the point of view of NHS Trusts, it offered some choices rather than requiring organisations to take pre-specified solutions from single vendors. The Department of Health identified priorities for five component systems - key components of any hospital strategy - which were deemed to be most likely to support improvements in services\(^ {42}\). The ‘Clinical Five’ systems were:
1. Patient Administration System (PAS) with integration with other systems and sophisticated reporting;
2. Order Communications and Diagnostics Reporting (including all pathology and radiology tests and tests ordered in primary care);
3. Letters with coding (discharge summaries, clinic and Accident and Emergency letters);
4. Scheduling (for beds, tests, theatres etc.);
5. e-Prescribing (including ‘To Take Out’ (TTO) medicines).

Emphasis was also placed on linking systems together progressively over time, as opposed to implementing a suite of systems in one go (as had been assumed by the National Programme). That is, the Integrated patient records were still desired, but viewed as a long-term goal. Hospitals were more likely to develop integration engines – systems to integrate existing systems – rather than the enterprise systems promised in the National Programme.

During the period of this study, then, the National Programme for IT continued, offering greater flexibility to NHS organisations. And as we will see in later chapters, informatics teams developed local strategies which were consistent with the Health Informatics Review. In practice, the Review was the main strategy on the ground in the NHS during the study period.

### 3.9 Concluding Comments

In this chapter we have reviewed the available empirical evidence, set out the theoretical frameworks that we drew upon in the study, and briefly set out the policy context. Between them the evidence, theory and policy provide the backdrop to the empirical study reported in Part Two.
Part Two

4 Study Background: Sites and Systems

We now turn to our empirical findings. This chapter sets out background information about the three study sites, about the component system planning and implementation that we observed, and the Trusts’ IT strategies for 2010 and beyond.

We recognised that research sites were bound to differ in important ways. It is simply not possible to find sites which are similar on a range of dimensions, and in research in the NHS there are obvious differences between localities, in the size and nature of populations served, in the installed base of IT systems in acute hospitals, and so on. Further, the problems with the NHS National Programme for IT ruled out the possibility of finding sites implementing the same IT systems.

Case studies are a method of choice in this circumstance, when it is impossible to make direct empirical comparisons, but possible to study the same phenomena – IT strategies and projects in this case – in different settings. We explained, in Chapter 2, that the 2008 Health Informatics Review recommended that all acute hospitals needed five ‘base’ systems. Hospitals had different systems in place, and so responded in different ways.

The key point, for our study design, is that each of the so-called Clinical Five systems had similar characteristics – they spanned organisational and professional boundaries, and successful design and implementation would therefore require the support of a wide range of staff groups. That is, even though hospitals were implementing different systems, they faced broadly similar challenges, and were working in the same policy context, including the NHS National Programme and the Health Informatics Review. Our case study design was therefore based on the premise that, if we observed similar patterns across the three sites, those patterns would point us towards useful insights about the design and implementation of large IT systems.

4.1 The Sites

All three sites were acute hospital Trusts in the north of England. They were all large, with over 1000 beds and handling over 50,000 in-patient stays, 400,000 out-patient appointments and 150,000 accident and emergency cases each year. Each Trust employed several thousand staff and services were spread across two or more sites. Each served a local population of several hundred thousand people.
At the start of the study each site already used a large number of systems in wards and departments. Some supported discrete functions, such as in operating theatres, accident & emergency or oncology services. They also had dedicated Trust-wide networks, for example for patient administration and for pathology results reporting. Each site already had, or was in the process of writing and agreeing, a Trust-wide IT strategy. These strategies reflected key elements of higher level strategies – set by the Department of Health and by Strategic Health Authorities – and their own local priorities. The strategies focused on two main issues namely, (i) setting priorities for the implementation of ‘missing’ component systems and, (ii) linking new and existing systems together to support clinical services more effectively. All three sites had identified component systems that they did not have and which, they believed, were essential to the safe and smooth running of their Trusts. For the systems we studied, ‘off-the-shelf’ solutions were not available. All three Trusts therefore found themselves engaged in developmental projects.

4.2 First Trust

The possibility of developing an electronic patient flow system was first considered around 2007, after a senior medical consultant in the Trust had seen a demonstration of a US-based system, which at that time had not been deployed in the UK. He arranged for the suppliers of this system to give a presentation to senior Trust staff. The potential of the system was noted but the possibility of procuring and implementing the system was not pursued at the time.

The Trust’s strategy was written in 2009, to cover the period 2009-14. It stated that:

“The Trust IM&T Strategy is committed to the overall direction and vision for the NPfIT roadmap. However, recognising the likely timescale for the delivery of the strategic solutions, the Trust will consider the benefits of implementing local interim solutions where they offer a chance to deliver patient benefits sooner, with a view to converging towards national programme solutions when they become available.”

Reference was also made to the 2008 Health Informatics Review, which identified five key systems for secondary care – the Clinical Five systems discussed in Chapter 2. First Trust’s strategy included several of these systems including order communications, electronic document scanning, electronic discharge letters and the ‘patient flow’ system that we studied.

4.3 The Patient Flow System

A new ‘patient flow’ system was one of the investment priorities in the Trust’s strategy, which set out the problem:
“At present our information around beds is inaccurate, tardy, complex and in silos. Very senior staff are spending considerable amounts of time on a daily basis trying to get patients into beds. There are numerous examples where Director level decisions have been made on the basis of incomplete, inaccurate or missing information about the bed state. Significant return on investment (ROI) has been achieved by the implementation of bed management software designed to visually display bed states. This avoids the excessive waste of clinical time on administrative functions.”

The Trust had been examining its difficulties with bed management, length of stay and related issues and had made a number of improvements in the way these were managed. The role of patient flow lead was created to manage the bed management team, the administrative team that supported them and the discharge team that facilitated ‘complex’ discharges. A centralised hub, the “Ops Centre” was established where all patient flow information would be integrated.

The Trust had a major building programme on one of its sites, and the total numbers of beds would be smaller when the building opened. The Trust Board therefore wished to ensure that patient flows, and the utilization of beds, were as efficient as possible. One of our interviewees put it thus:

“So the Chief Nurse, the Clinical Director of IM&T, the Chief Operating Officer, Director of IM&T have all got this vision that currently there is a lot of time spent chasing beds within the organisation and the time can be physically walking the floors with lists going on to a ward and saying, “Right, Who have you got in a bed? How many free beds have we got? How many potential discharges have you got?” And there are layers of layers of different groups of people that either phone or go on to the wards, I would say 20 out of 24 hours a day, asking for information because the pressure to get people out of beds ..... to free up beds for [patients] coming in is absolutely huge and enormous.”

The Trust was also addressing the issue of single sex accommodation, a high level NHS policy issue, designed to ensure that men and women did not share bed bays. This was a particular problem on a number of traditional Nightingale wards in the Trust. The SHA was allocating funds for work in the area of single sex accommodation and First Trust made successful applications to fund a number of work-streams, including a significant sum for the development of the patient flow system. The SHA, for its part, believed that the patient flow system would lead to significant efficiency improvements, and so was funding the project on the basis that other hospitals in the region could benefit from First Trust’s efforts.

Members of First Trust’s management concluded that a patient flow system could contribute to improvements in both patient flow and in separating men and women, and indeed also to meeting other NHS targets.
The allocation of beds across the hospital sites was coordinated through one Operations (“Ops”) Centre and a patient flow lead was appointed to manage this centre and to work with clinical site managers who managed patients’ movements, including movements from A&E into the hospital. It was decided that a new electronic patient flow system was needed to provide information to the Centre, and to staff on the ground, to monitor patient movements. This system would be used to manage the allocation of patients to beds and to improve the efficiency of the administration of patients’ progress through their hospital stay from admission to discharge. Immediate benefits were expected through savings in staff time, because they would spend less time on managing beds and managers would not have to visit wards to check on bed availability.

The stated overall patient flow system project aims were:

- To streamline current processes for allocating beds for acute and elective admissions, and to increase ability to predict capacity
- To contribute to reduced length of stay by improving efficiency around decision-making after investigations
- To enhance the ability to deliver single sex accommodation by identifying beds suitable for male/female patients in areas of single sex accommodation.
- To provide clinicians with efficiencies in patient management by providing high visibility information with understandable icons, in real time where appropriate.

Early in our fieldwork local staff anticipated the system to help them to achieve efficiency savings and also increasing income through achieving a higher throughput of patients. However, it proved difficult to identify these benefits in practice:

“People are happy to sit round the table and say, ‘oh I can see a million quid a year savings in this system’, but when they actually start looking and feeding it with the other initiatives they go, ‘oh well we cannot count them twice’”, and it’s very difficult to say how much the system will actually save and how [many benefits are attributable to] these other initiatives.” (Informatics manager)

The patient flow system was developmental: the suppliers were designing it specifically for First Trust, although its design was based on modules that were already in community hospitals. The development and implementation would therefore run concurrently, with feedback from early experiences being incorporated into later releases. The SHA made a significant contribution to the funding of the project, on the basis that it was viewed as an important new system, and would help First Trust and subsequently other Trusts to comply with the national directive, and manage patient movements and beds more effectively.

Information from the system was displayed on electronic plasma screens. Staff managing the flow of patients into and through the hospitals could see a Trust-wide summary showing the number of beds that were occupied or
free on each ward. On the wards the screens displayed the beds, along with several items of patient information including predictions of discharge dates. Ward staff could allocate patients to beds using the system and an alert would show if this decision would result in a “gender breach”.

The system received patient demographic data and details of admissions, discharges and transfers from the Trust’s patient administration system (PAS) through a Trust Integration Engine (TIE). There were plans for information about the availability of patients’ Radiology and Pathology results to also be transferred from their respective systems through the TIE to be displayed as alerts on the patient flow system. Information flow was in one direction. Information input into the patient flow system was not used to update the PAS automatically. There was provision to input patient data directly into the patient flow system if the PAS system was not operational for any reason, but it needed to be transferred into PAS when that came back into operation. Keeping the information in the system up to date was therefore dependent on ward staff informing the hospital administration as discharges and other changes occurred so that the information could be input into PAS and then passed through to the patient flow system.

We should say a few words about integration engines. An integration engine is, in essence, a system which sits between existing systems. It either moves data from those systems into a single logical location, or it leaves data in the existing systems but allows users to ‘view’ data in several systems on a single screen. Integration engines can be contrasted with enterprise systems, which are more commonly used in other sectors. Enterprise systems are, typically, suites of systems offered by a single supplier and which are integrated with one another. The SAP administrative system, covering payroll, HR and other functions, is a widely known and used example of an enterprise system. First Trust, and as we will see the other two Trusts too, had achieved a measure of integration at the start of the study. (It appears that integration engines are a usual solution in the NHS, and we reflect on reasons why they might be used in Chapter 9.)

4.4 Second Trust

At the start of the fieldwork Second Trust was developing its IT strategy. In meetings there was a recognition that, in the absence of a clear strategy before 2010, it had been difficult to set priorities for new investments or for in-house development and support. The result was a piecemeal pattern of developments which did not meet the current needs of the Trust, and of ‘siloed’ systems that were valued by the staff who used them but which were not integrated with other Trust systems. What is more, there were three clinical information systems which performed similar functions, each used in different parts of the Trust:
"... We had the [A] database, which was able to do an awful lot of what the [B] system did, and I came along and looked at it and said well neither of these are electronic patient records, and everybody was a bit taken aback, well it can do this and it can that, and I said it might well be able to do that but that's not what an electronic patient record does." (Informatics manager)

Looking forward, the Trust needed a strategy in order to co-ordinate the selection and implementation of new systems, and integration of systems across the Trust:

"There’s been a recognition that there are lots of industry standards out there in terms of what technology can do for you, wireless for example .... so you can pull information together and create views of information that support the clinical decision making process, that we know can happen .... but haven’t done it consistently to an appropriate standard across the whole of the organisation. I think that’s what the strategy is about. And I think that’s what the challenge is to the organisation.” (Informatics manager)

The strategy sought to integrate existing systems where possible. An integration engine and portal would be used to achieving integration between hitherto separate systems, and new systems as they were implemented. (Conceptually, a portal is a single screen, via which clinicians can view data from a wide range of systems.) Trust managers also needed better IT infrastructure, to help them to manage key NHS targets such as 18 week waiting times. Clear linkages are made between management and clinical information needed to support the business of the Trust:

"The Informatics strategy aims to respond to these challenges, delivering systems to facilitate the streamlining of processes, reducing costs and making the most effective use of clinical time to deliver direct patient care. Provision of high quality information is an essential element if the Trust is to meet performance targets, maximise income, track the progress of change and share information with our healthcare partners in a secure and controlled environment.” (Draft strategy document)

A new Trust Integration Engine would be a key development, enabling data from the existing Patient Administration System (PAS) to be shared across the Trust:

"The Trust is initiating a first phase development to integrate key systems using a new Integration Engine and developing a clinical portal application to initially support clinical documentation. There will be single sign-on to the clinical portal which will display the emerging EPR for a patient, without the need to sign-on to individual systems. The Trust will work with a commercial partner ... [and] with our in-house teams and existing suppliers to achieve an integrated solution to provide access to, and the potential to
create, clinical correspondence and documentation via a clinical portal”.

(Draft strategy document)

The strategy was closely aligned with the national policy, the 2008 Health Informatics Review. The Review’s Clinical Five systems were identified as local investment priorities, it was recognised that the Trust should work, in the longer term, towards EPR: EPR was described as “emerging” within the strategy.

At Second Trust, the main argument for introducing electronic prescribing was that it would improve the clinical safety of medicines management. That is, electronic prescribing would help to reduce the number of prescribing errors:

“What’s driving it is patient safety that there is a belief among the multi disciplinary people leading this that if we can introduce e-prescribing and e-administration we will make care safer for patients, we’ll improve our productivity, we’ll improve out efficiency, and therefore ultimately we’ll save money but give patients a better experience ... that’s what’s driving us to do it.” (Clinician)

There were other anticipated benefits, including improvements in the quality of nursing care:

“And from a nursing point of view it shouldn’t mean that the nurses sitting at computers at the nurse’s station and spending so much time inputting onto a computer that they haven’t got time to go back and speak to a patient about their medicines and how they’re making them feel or how whether they know how to take them when they get home. So that’s I guess my vision is that isn’t what will be happening. Is that it will be used as a tool to make things safer but not that it will be used instead of talking to patients”. (Informatics manager)

### 4.5 The Medicines Management System

The need for electronic prescribing in Second Trust had first been discussed seriously about four years ago. A consultant was given responsibility for Medicines Management, with a brief to introduce electronic prescribing to the organisation. The motivations at the time included a desire to improve the safety of prescribing – this being an area where national policies were highlighting the importance of reducing prescribing errors – and to encourage a more multi-disciplinary approach to medicines management. Neither of these issues could be addressed, it was felt, without a hospital-wide electronic medicines management system.

It was recognised that the support of key professions and influential individuals within the Trust would need to be secured in order to achieve organisation-wide implementation. Informal conversations were held with clinical staff around the hospital, to gauge support and to open discussions about the need for a new system. A small expert multi-disciplinary team
was created in 2008, to carry out the more detailed work required to develop a business case for a new system. The Trust decided to procure an e-prescribing system in 2009, reviewed candidate systems, and undertook a number of site visits. A contract was agreed with the preferred system supplier in December of that year (ie at the start of our fieldwork period).

The business case was agreed in January 2010 and the contract was signed soon afterwards. The supplier appointed a project manager in February and the Trust project manager took up post in March. The first Board meeting for the project was held in April. The project initiation documentation was agreed in June, along with a detailed project plan that had been updated and become more detailed as the supplier and Trust project managers specified and timetabled implementation activities. PIDs were carefully followed and updated regularly as more details were agreed.

### 4.6 The Component System

The Trust procured an electronic prescribing system that was in use in hospitals in other European countries, but not in any other hospitals in England. It would need to be adapted for use in England, and this was therefore an R&D project rather than an implementation of an established, stable system. The stated purposes of the system were to provide a more efficient and safer medicine management process, and to make it easier to audit medicine use across the hospital. It was anticipated that it would enable problems with prescriptions to be resolved more quickly, reduce problems caused by loss of records between departments, and reduce errors made in transcribing prescriptions by hand.

The system would support ordering, administration and supply of medicines, replacing the current paper prescribing systems. Medicines management is a multi-disciplinary task, involving doctors, nurses and pharmacists, but the majority of the users of the system were likely to be nurses engaged in the process of medicine administration. An early decision was made to pilot the system on two wards before rolling it out across the Trust. The pilot had two main functions. First, it would test whether it is possible to anglicise the e-prescribing system so that it could be safely used in an English secondary care setting. Second, it would provide the evidence and costings required to prepare a full business case for ‘roll-out’ to the rest of the Trust. If the implementation was successful it would provide prescribers with an interface for entering prescriptions electronically, the ability to build up individual patient medication profiles, facilitate use of speciality based drug protocols, and decision support. The system also supports the dispensing and administration of medication. Clinical staff would be able to access the medication record from a computer anywhere within the hospital.

The pilot phase also included the development of “robust interfaces” for data exchange with the Trust’s new integration engine. There would also be a number of application interfaces required, including PAS for patient
demographics and episode information, results, a chemo-therapy prescribing and administering system, and a dispensing requests system, to ensure accurate transfer of patient and medication information. The development of the system was reliant on the availability of wi-fi technology, which was not available in all parts of the Trust. The system was piloted in clinical areas that have also been selected for a parallel wi-fi pilot implementation being carried out at the same time.

4.7 Third Trust

At the start of the fieldwork, Third Trust was working towards its ‘vision’ of EHRs available throughout its hospitals, and towards paperless working. The Trust knew that these goals were some years off, and that progress would be incremental and iterative – to use their own terms - but that they nevertheless informed its decision-making. The development of the building blocks for an integrated clinical record system had started in 2007. The informatics team had previously been involved in the procuring and development of a hospital wide record system. During this process there was a marked shift, from a situation where one clinician felt like it was "gobbledygook to me really, managerial speech I suppose,” at the start of the process, to one of the great responsibility when it came down to choosing the suitable companies and negotiating contracts. A number of places with relevant systems in use were visited. Using their professional contacts, medical staff were able to see some products in action, and the visits provided a reality check. What they found was not encouraging:

"... Basically they'd rushed it through, it was a shambles ... but that was very useful, of course, because you go through these bidding processes, and you see these companies ... Well they tell you that we are doing this, we're doing that, and actually underneath, truth is, nobody can take you to an IT system that is used by clinicians across the board in the UK.” (Clinician)

Third Trust staff concluded that none of these systems meets the needs of the hospital, but they have the potential to do so, and this encouraged all parties to continue.

On top of site visits and product descriptions, the suppliers also engaged with the hospital doing workshops "selling the product to the staff”. Third Trust staff were involved in providing input through a questionnaire, allowing them score the various products and how each of them came across. There was also a technical evaluation team which examined tenders in detail. Finally the financial aspects were all so taken into account. All scores were suitably weighted giving a preferred supplier. After a lengthy period of contractual negotiation Third Trust was about to sign a contract when the Department of Health became involved. A decision was made to work with the Department, partly on the basis that the Trust would be contributing to the development of a system that might be used in many
NHS sites. Third Trust would ‘get in on the ground floor’ of a major IT development.

Recognising that they were signing up for an unproven (in the NHS) product, the Trust asked the suppliers for a ‘proof of concept’, an assurance that the system would work, and this was built into the contract. At the end of the ‘proof of concept’ stage the Trust found the following:

- Conceptually the system worked
- There were some practical delivery problems
- Areas where improvements could be made were identified.

### 4.8 The Electronic Document Management System

Within the Trust’s overall plans for an integrated records system, we focused on the design and implementation of an electronic document management (EDM) system. The Trust – along with many others in the NHS – took the view that it needed to move from paper to electronic records, and that in doing so it would be important to have access to historical records. The EDM system would allow the Trust to scan records, making them available electronically. One manager described EDM as the following:

"It's a hard file management system, so it's like a document handling management piece of software. So you can take anything, scan it, and if it's bar coded it'll sort it in to document type and then store it like a PDF file …"

Clinical notes are scanned and converted into a PDF, and would be accessible through an electronic medical record system, which was also to be implemented. Simply put the EDM is a static electronic facsimile of a paper document. The PDFs would be stored in a document management system in the first instance, but the medium term objective was to integrate them into the Trust’s EPR system, implementation of which was due to start around a year later (ie during 2010).

### 4.9 Concluding Comments

This overview of the sites’ strategies, and their early work on the systems we focused on, allows us to make some observations. In all three sites the systems we were studying – patient flow, medicines management and document management – had been discussed, and then actively planned for, over a period of years. We were not working in the sites in 2008 or 2009, but documentary evidence and interviews suggested that the development period was important, in that it was the period when local staff could work out what sort of systems they wanted, talk to suppliers and other NHS organisations with relevant experience, and begin to build support for procurement and implementation with key management and
clinical colleagues. In all three sites small teams were created, and these led the early thinking, reviewing and decision-making.

All three sites identified benefits that they expected the individual systems – and their strategies – to bring. There were two broad classes, one financial and the other concerned with improvements in the quality or safety of services. The process of identifying benefits was necessary administratively, as sites had to prepare business cases that were scrutinised by Trust Boards. But they seemed to have a wider value, in the context of discussions with clinicians and managers who would need to help with, or who would be affected by, implementation. The sites recognised that design and implementation would not be easy: they appreciated that they were embarking on development projects, and that a great deal of work would be involved. But all three believed that they had realistic prospects of success. At First Trust, for example, the functions of the system were summarised in the Project Initiation Document:

- Research by a number of leading IT healthcare providers has found that one of the core reasons why ward based staff do not update or ‘feed’ central systems is because there is no local incentive to do so – patients in their areas are still receiving high quality care. As such there needs to be a mechanism whereby the feeding of a central system, has direct benefits to those in local areas.
- Technology now exists, that allows the accurate graphical and colour coded representation of bed occupancy at a ward and, site and Trust wide level.
- These systems are integrated into current bed management and diagnostic IT systems such that an update in one of these systems automatically, and in real-time, updates the graphical representation. Alerts and timers can also be configured to graphically notify staff have events happening (e.g. result available of action) and time expired since event occurred.

As we will see in the next two chapters, it was important that key stakeholders shared assumptions about the value of the systems, which would justify the length of time between initial discussions and implementation, and the effort that it would take to design and implement them.

Finally, we were struck by the fact that all three Trusts were considering ‘path breaking’ systems. We sensed that there might be two reasons for this. One was that the Clinical Five systems in the Health Informatics Review were not all ‘tried and tested’: complying with the policy involved an R&D process rather than implementation of battle-hardened systems. The second was that there seemed to be a culture of promoting early adoption in the NHS:

"... You know we wanted to be early adopters; it was going to be the thing everybody was using, because it was going to be a national thing, pretty
much, or certainly a regional thing. So everybody was going to be using it, we're here so let's get it." (Informatics manager)
5 Developing Systems

5.1 Introduction

This chapter focuses on the design and implementation of the component systems we focused upon, and on the wider informatics developments in the Trusts. Chapter 6 has a different, complementary, focus on the governance of the projects and programmes.

For the sake of clarity, material is presented in the order in which it unfolded within the sites. The sites started and finished in slightly different places from one another, so it would be confusing to tell the story of each site in parallel, month by month. The next section picks up where Chapter 4 finished, with the early stages of building agreements about the need for particular systems. Then we move on to the detailed discussions involved in identifying system requirements.

The next section begins to place the individual component systems we studied in context, showing how progress was influenced by the need to integrate the component systems with one another, and how this in turn was influenced by wider developments, integrating PAS, integration engines and other systems. Then the fact that negotiations continued after implementation is highlighted. Finally, we comment on the ever-present need to balance the desire to design the system around local working practices with the need to standardise – standardise because the ward down the corridor was different, or the wards in other hospitals in the region, or in other places that suppliers anticipated that their systems would be used.

5.2 Building Agreements

We start with early relationships between key Trust staff, suppliers and other stakeholders. In each case the Trusts appear to have taken the view that they were comfortable with the suppliers – they could work with them and would end up with a good product – and the product was the right price. All three Trusts opted for arrangements where, in effect, they would pay a lower price for the product in return for their collaboration in development.

We saw in Chapter 4 that all three Trusts created small teams at the start of their projects. In each case, the teams started out with few pre-determined ideas about appropriate suppliers, or about the content of the systems they needed, beyond clinicians’ own appreciation of the clinical tasks that might be supported. They all made site visits, spoke to professional colleagues, and read relevant reports. At Second Trust, for example, the team found a 2007 Connecting for Health review of medicines management systems.
helpful. The team recognised that the NHS National Programme was not in a position to develop an e-prescribing system itself, and that there was a lack of established solutions to pick from:

"... there was a lot [in the review] about spec(ifications), there was a lot about quality, there was a lot about what it could do, but actually in terms of hardware and software there was little“ (Clinician)

A key role of the specialist teams was, therefore, to review the systems available. They looked at systems in use, where these could be visited. This enabled them to develop their understanding of what was available, and of the views of clinicians using them, and they started to form views about the type of product that they required themselves:

"We set out to look at what was around in the UK, we went back to [A Trust], we’ve been to [B}, we’ve been to [C, D and E], and so we’ve tried to look at what’s out there. And then when we thought we knew our game we ...tried to put forward the case for it“ (Clinician)

A careful process of elimination of candidate systems was followed and decisions were made on the basis of system design, availability, clinicians’ requirements, risk of over-dependence on one supplier and cost:

"... and we talked to colleagues in [another site], both of whom use it, and we weren’t satisfied that that met our needs ... we were uncomfortable about having all our eggs in one company basket, in other words having all our prescribing and administration in the same basket as our computer system” (Clinician)

"though, and there were some features of that system that we didn’t feel were going to meet our needs, one of which was the issue about interfacing to the results server, another was about interfacing to information to support prescribers about the medicines themselves, and another issue was about the discharge arrangements for the patients, so we discounted that [system], principally because we didn’t want the same supplier to do everything, but because the tool that’s currently available doesn’t look like it meets our needs ...“ (Clinician)

There were two types of interdependent negotiation processes in this time period. There was an internal process within the Trust, which included an exploration/assessment of whether the product was good enough to procure, building of support at a senior enough level to support a business case and then finding the right time to present it. The second type of negotiation process was between the Trust and the supplier, to agree legal terms and conditions and a mutually agreeable contract:

"...there was a period of courtship, which went backwards and forwards between us and senior management, and increasingly negotiated, and a lot more technical detail into what the system would do, how it could be done, a lot of demonstration to senior management, a lot of demonstration to us, demonstration to senior management, value judgements from me,”

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First Trust provides an example of the process here. Following a call for tenders, three proposals were received for the patient flow system. The suppliers gave demonstrations of their products and these were scored by a range of professionals against a defined list of functionalities. The scores were then compared with costs, to arrive at a ‘cost per point’ rating. Two products had similar scores – a system that had been viewed in operation in another Trust and one which had not. The first system was already in use, but its costs were higher than expected, and it was deemed unaffordable. The purchase cost of the second option was, the Trust felt, affordable. But it was not in use in any other English Trust at the time. This meant the final decision was primarily based on costs, although at the end of a process where a number of factors were taken into account. The SHA offered some funding, but in return insisted on tight deadlines for delivery and there were doubts whether the more expensive bidder would be able to meet them. The choice was summarised as:

"Essentially we had a proven product which was unaffordable for us and we had a novel opportunity to be involved in developing a product which we probably could afford.” (Clinician)

As we have already noted, Second Trust won development monies from its SHA, and to this extent the development was opportunistic: it might not have happened without the money and management support from the SHA. Similarly, at Second Trust there was initial contact with a supplier in mid 2009, with the supplier seeking to anglicise a product that it already sold in other European countries:

"We felt that the ... product actually offers us that, we’ve looked at it in practice in [Europe] the patient care journey is a bit different than here in some ways, but the in hospital management isn’t particularly different, and it ...appears to offer us what we need with quite a lot of work being done locally.” (Clinician)

Once procurement had been completed the Trusts followed standard NHS project management procedures, starting with a Project Initiation Document (PID). These ‘baseline documents were then updated, and superceded, throughout the project by a series of more detailed stage plans. It was acknowledged, for all three component systems, that successful implementation was dependent on other projects, and on the quality of the supplier. At one of the Trusts, a meeting in the spring of 2010 concluded that:

- The interface message types specified within the contract are unlikely to be sufficient. [Person present] stated that [the supplier] will judge
each request for additional interface on its own merits prior to deciding whether the additional development is chargeable.

- [Another person] requested that the following be added to the Dependencies section:
  - Wireless network being available on the pilot wards.
  - Data to be transferred via the interfaces can either be retrieved or stored by the sending/receiving systems.
  - Any new functionality requested for go live falls in line with the technical capabilities of [a second company], the company’s product roadmap and delivery timescales.”

The IT infrastructure in the Trust required development:

"... if we'd bought a system off the shelf, we couldn’t introduce it because we don’t have a wi-fi system in the trust .....We’re also stuck until the PAS is sorted because there isn’t a spare port to put anything into the PAS.

Q. Oh right, it’s literally full?
A. It’s literally full. " (Clinician)

Sites also had to undertake preparatory work, laying the ground for their component systems. This preparatory work threw up unexpected issues, which were sources of both frustration and useful learning. In Third Trust, for example, it was necessary to re-design all of the forms used in a pilot department, so that they could be read by the EDM system. And as part of that process, the Trust had to update its bar coding. One problem turned out to be that the department had already started barcoding notes, as part of another project:

"...we’ve had to barcode all the documents that we use in the case notes, and they’re now looking at re-barcoding, putting a different version of the barcode, putting letters in front of the barcode ... I raised the question well you know we’re already using the barcoded forms in ENT and eye notes, what then happens if you’re going to introduce another [barcoding system] given that we’ve got three month’s worth of information in the notes already? ... And this is the type of thing that’s a big worry, and I raised that as a concern, I said you know you need to be letting [a lead clinician] know that that’s your intention ... And that’s the worry, that they [informatics] are making decisions and not linking in or thinking about the work that we’ve already done” (Middle manager)

This problem had to be resolved in a series of meetings, but examples were also given of substantive changes that, in the view of some at least, improved administration. Some of this work entailed detailed changes, for example in the design of work spaces:

"We’ve had to change way in which the patient admin staff prep the notes, prepare clinics, to build in the process of printing off the dividers, that’s an
additional duty for them. So we’ve had to identify areas where the notes go, one area in which the notes all go through to make sure that every set of notes would have one of the orange [file] dividers”.

More generally, the changes in Third Trust were far reaching. Discussions between the pilot department, informatics, medical records and the central patient admissions service resulted in the setting up of a scanning group, which had oversight of developing new scanning bureaus.

5.3 System Requirements

This section moves on in the process, and looks at the ways in which teams went about identifying system requirements – in broad terms, this was the part of the process where Trust staff articulated what they needed their component systems to do, and allow the suppliers to work out how to meet the Trusts’ requirements. The Trusts used two distinct methods to do this. First, clinicians were asked to identify their needs.

Hospital project teams worked with clinicians and suppliers to map current ‘business processes’. Three relevant points came out of their experiences. The first was that apparently small changes could involve major changes in working practices, or role changes, for the staff involved. The result was that changes had to be negotiated – they could not just be implemented. The second was that apparently similar staff groups wanted different information from systems. For example, in relation to discharge from hospital, medical staff were interested in patients being medically fit for discharge, while other groups would see “ready for discharge” in the broader sense of being able to cope at home, both in terms of their own abilities and the availability of support as necessary. The third was that the processes mapped were current processes. The local view was that it was difficult, but useful, to understand current working practices, as a basis for the design of component systems. In principle, it would be helpful to identify future practices – practices that might be different because the IT has led to change, and because there have been other changes in the management of services during the same time period. But it was simply not possible to model the future services – with the IT in place – with any confidence.

Thus at Second Trust, where the task was to adapt a system used in other European countries:

"I think it’s very easy to get distracted by the little things. So you know, you see something that’s not spelt right and we’re encouraged to put [a change request in] ….. Let’s look at how the system really works and work out what we want it to do and match it to our processes. So the change request process I think was designed for us to report anything that we wanted changing. But like I say it’s really easy to pick up those trivial things and more difficult to get your head down and pick up the things that are
really different. And we needed a good understanding about how our systems actually worked as well.” (Clinician)

It took time for Trust staff to understand what kinds of comments and requests were worthwhile – early evidence that implementation was a learning process, rather than a straightforward implementation of a well understood system.

The second method involved a series of joint reviews with the supplier to come up with an agreed set of requirements. In Second Trust this process was viewed positively:

"[Colleague A] reported that she and [Colleague B] had had a very useful meeting with her counterpart at [another Trust implementing the system] and managed to complete the nursing functions. [They] also met with Product Specialist, who had helped by clarifying what’s needed from the clinical leads in terms of expressing the clinical requirement. [Colleague A] is now working on the next wave of [requests] and adjusting them to be more clinically focussed.” (Meeting minutes)

These discussions between Trusts and suppliers led, in all three cases, to the identification of problems that would have to be solved if the projects were to be successful. Thus in Second Trust it became clear that the legislation governing prescribing differed between European countries: the system would need to be tailored to prescribing practices in England. High level discussions took place within the supplier firm, whose developers were based in another European country, as a result of which it was decided that the English version of the system would be developed separately from the existing system.

The next phase of work involved extensive acceptability testing. The suppliers undertook a great deal of this away from the Trusts, so we did not observe this phase directly. We were, though, able to observe what happened when elements of solutions were presented back to the Trusts. A final list of requests for changes at one of the Trusts signed off by the system implementation team in late 2010, and the ball was in the developers’ court:

"...I guess another crunch date for us is [month]. Whatever comes back from [the developers] will be key. If what comes back from [them] is a load of rubbish, we will not be implementing it [in 2012], because we were clear that we will not be implementing anything we don’t think will work.” (Clinician)

The radical nature of changes to working practices was emphasised at Third Trust. Having already worked out detailed changes in administrative working, they discovered that the new EDM system would force further changes. For example, in their usual processes, a patient arrived at a clinic, was identified, the folder could be pulled from the archive, any new forms added, and so on: this was a well established manual process. But it
became clear that this would not be possible for all patients with the electronic system. Only patients registered as being active could have barcodes printed, which meant that the PAS had to hold accurate and current information. Any omissions or errors would interrupt flow, causing patients and staff disruption.

"... we thought ... the software worked real time so you could print something off real time, so if somebody walked in to a clinic as a casualty ... you could print the barcode off there and then ... [colleague] quickly found out it's not real time, it's a day delayed. So it was oh well you cannot pull out now, and [Colleague A] had to work it out with [Colleague B], are we going to work, when are we going to get the barcodes, the sheets in, because we cannot do it there and then".

Here is another example of "discoveries":

"... so these encounter sheets ... you can only print them off if the activity is on the system, so [you have] to make sure that all the activity is on the system. As we went around we found that some of the activity was not recorded on [the system] and it was going back to the patient services managers and saying why is this activity not recorded? And it brought up all sorts of issues like that. And we then set up clinics on the system so we were then able to separate that information out in the notes .... the [guidance on the] pathway of the notes said if they came in acutely ... the notes would come in normally from the library, if they came in as a planned admission ... the notes would come from the secretary, so it was [a question of] working out the pathway of the notes to the wards and who would put in the dividers there ...".

In practice this meant that managers had to change the way that they held onto and processed patient information. Once these processes had been re-examined and the necessary processes put in place, the system ran smoothly. This is an example, then, of service design issues that were unexpected, and caused consternation, but where problems were then overcome.

5.4 Sequencing and Integration

While some of the development work focused on the detailed design of the component systems, there were also extensive discussions and debates about their relationships with other systems – that is, about the ways in which they would integrate with other systems. These focused on two main issues, the sequencing of implementation and interfaces with integration engines or with other systems (eg PAS).

At Second Trust, for example, the medicines management system was dependent on wi-fi, and so had to be piloted in the same clinical areas as the wi-fi pilot. This led to compromises:
"the areas chosen for the wi-fi project ... have different priorities from us again. And the flow of patients may not match an ideal for the type of ward you would want to pilot an e-prescribing system on. You know if patients only come onto a ward for 24 hours and then are transferred off somewhere else that’s a nightmare [for pharmacists] ...." (Clinician)

This particular concern was addressed, in that it was agreed with key clinicians working in the pilot areas that the pilot would be extended, to allow the medicines management team to following patient transfers onto a neighbouring ward. That would allow them to evaluate the new system in a live environment more thoroughly.

The system would also need to be integrated with a drug database. There are established systems which hold, and regularly update, drug information, including authoritative lists of drugs which can be prescribed, and contraindicated combinations of drugs. Early on, the suppliers did not realise that they could not use the drug database they knew about, a national system used in their home country. Research into the options available in England suggested that there was a choice between a free system which did not offer the functionality the team wanted, and a system they would have to pay for which did. There was a problem here, which was that the cost of a license for a drug database had been missed out of the business case – seemingly a straightforward oversight. But the problem had to be solved:

"So the drugs database we’ve [got to] get it right because if we’re not able to give our prescribers the decision support information that’s [going to] be useful to them they’ll very quickly get fed up of this kind of system ... one of the big benefits of electronic medicines for them is decision support software." (Clinician)

In the same period, the need to sort out the interface with the hospital PAS was also an issue. As one of the interviewees put it:

"Without the interface to PAS we don’t have a project.... [we need to] resolve the interface between the e-prescribing system and the PAS, and that’s needs some more energy putting into it, and once we’ve done all that, then we’ve ... got a lot of people to engage with, before we start to get into an implementation phase, which we’ll do in a couple of clinical areas." (Clinician)

At Third Trust, similarly, the timetable for the electronic document management system was coupled to the delivery of modules of an electronic patient record system. The latter was not delivered at the date anticipated by the Trust, with potentially serious consequences:

"[A senior trust manager] noted that the [EDM] project was based on a business case and that any slippage beyond March 2011 would imperil the financial viability of that business case." (Meeting minutes)
5.5 PAS, Component Systems and Integration Engines

The Trusts were also pursuing integration strategies. Integration engines were central to developments at First and Second Trusts, while Third Trust’s plans were focused on the implementation of an enterprise system (ie an integrated suite of systems, from a single supplier). In all cases, the PAS would continue to be the source of basic patient data, and this would be used to populate and to update other systems.

At Second Trust, the integration engine was the vehicle through which data from individual systems would be combined, so that clinicians could view patient data on a single set of screens. The project manager explained the central role that PAS played:

“We’ve got a lot of systems out there with poor quality data, and we’ve got a lot of systems out there that just will not talk to each other because they’re not standardised, so to explain, if you imagine, you’ve got lots of different systems that hold different parts of the clinical picture about a patient, so a patient can occur lots of times on different systems and different clinical data are held about them. There’s got to be something common about those patients that enables you to link them together … and it makes absolute sense for that common numbering to come from our PAS system, because PAS drives the organisation, so if there’s any activity done here there should be a record of it, from an admin perspective, on the PAS system.” (Project manager)

This meant that unique patient identification was crucial, both for the integration engine and for individual systems, including medicines management:

“Until we implement that unique numbering system within [the medicines management system] we’ve got nothing that we can reliably link the patient record in [the system] to any other clinical system … it just wouldn’t connect. So it’s really important that we introduce those numbering systems within [the system] …. So to me it would seem common sense for us to implement that local numbering system and the integration with our [integration engine] before you start trying to take anything out of it.” (Project manager)

The central role of the integration engine, and the need to develop interfaces with individual systems, meant that its development timetable had direct effects on other developments:

“I knew the interface would take a long time, but what I didn’t know at the time was … how long it was going to take. The initial thinking was it was all going to be done by November, finished, done, tested, available. But at one of our early meetings it became quite clear that it was not going to be ready then, so pushed [other developments] back. But that doesn’t mean we should not do it, it’s absolutely the right thing to do … it just enables so much more later on down the line. So there are challenges, but they’re just
challenges that you’ve got manage in such a way as to make the organisation understand, or the project board understand why we cannot do it any other way.” (Project manager)

In the case of the medicines management system, a series of discussions was held between the two teams to identify how resources could best be used between the two.

“The TIE is now scheduled to be complete and available for testing in Jan 2011. [The project manager] explained that the development team has confirmed that, at this stage in the [integration engine] development, the only useful assistance we can provide is resources to shorten the acceptance testing timeframe and capital has been made available to the development team for this.” (Meeting minutes)

However, even with the extra resources the team had to bite the bullet and adjust rather than compress the development dates for medicines management pilot to go ‘live’. The medicines management board identified a new end date for the go-live as end of June a go back of three months on the initial tentative go-live date of March 2011. The board was concerned to set a realistic date rather than having to continually reset the date. The need to allow for contingencies was acknowledged, so that they could tackle any other issues that arose, in particular any risks associated with the new drug database.

5.6 The Portal

The other major strategic development going on in the same time period in the Trust was the development of a portal, a ‘layer’ on top of the integration engine: in simple terms the engine enables integration of applications and the portal provides a common patient view. The strategic idea was that these two developments would provide a platform for the creation of a hospital-wide single patient record system:

"you cannot get a full EPR without [medicines management] which is why if you were to look at our strategy, it’s based on integration of existing systems and new systems where we have gaps ... provides integration of all those key systems around a single sign-on portal. And that gives you a view of the patient record, so you have a single sign-on, into the portal, you identify the patients, because it’s got a key feed from the master patient record into the portal, and the portal goes away and pulls back from live databases, a kind of view of the electronic record....” (Informatics manager)

The key point, for this report, is that there was broad agreement over the vision, but early on different views about how these changes can be achieved technically, and also concerns about the quality of data that would be accessed. Early on in the development stages of thinking about the portal, an informatics manager outlined the technical challenges and choices:
"Our clinical portal project has commenced and there are a couple different sets of technology you can use on this ... it’s almost it’s proof concept work, in terms of how we’re going to connect it all ... [I worry] around this one because there are two ways of doing it, one is to use the sort of technology which in essence data mines and goes in and pulls everything in to one view at one time but doesn’t store that, our pilot is looking at storing [data] in a different place ... and the worry I have ... is because we are so big and because we have so many systems it actually ends up as a really big system in its own right to run.” (Informatics manager)

There were, then, major strategic technical issues that had to be understood, and implementation plans developed. It was not obvious to us that solid technically based answers were readily available to Trusts, or that Department of Health policies indicated which option to choose.

Decisions about the portal and integration engine had knock-on effects elsewhere:

"...from [the medicine management system supplier] point of view until we have something concrete to show them ... they cannot really cannot get involved because they could end up doing a lot of work that is wasted. So we’re trying to sort of run alongside each other, kind of keeping each other informed of what’s going on and hopefully come to a point where we can start to work together.“ (Informatics manager)

This example helps to highlight the tensions between two approaches to innovation, which might be termed planned and organic. The general literature on innovation suggests that many successful projects are a blend of the two – neither one on its own is sufficient. The medicines management team were keen on managing a project with fixed scope and objectives, sorting out the considerable interface issues during the project, but only turning their attention to wider integration issues later on. From the point of view of those involved in the portal development, though, a more open and developmental approach seemed to be unavoidable.

5.7 Moving Milestones

A combination of the time required to think problems through, to negotiate with stakeholders, the need to plan implementations in logical sequences, and reliance on the delivery of key systems all seem to have contributed to slippages in implementation timescales.

At Third Trust the problem was straightforward: the promised system was not delivered, at least during the period of the fieldwork. As deadlines and promised product updates came and went, the informatics team changed its role. It had previously been the main point of liaison with the company. But as the year wore on, rather than continuing to explain the difficulties to Trust colleagues, they encouraged company managers to come along to
board meetings. They emphasised their positions within the Trust, as opposed to being ‘honest brokers’ between the Trust and suppliers.

The informatics team reflected on the delivery failure. The Trust had seen a system in other Trust, and assumed that was what they would be receiving. But the supplier had decided to change the product it delivered, and the Trust had assumed that the alternative was essentially the same – there would be no consequences for project timetables. Over time it became clear that this was not the case. The Trust felt that the supplier had committed to unachievable deadlines.

In addition, the Trust had little meaningful leverage with the contractor, as the contract for some key systems – though not the EDM – was held by the Department of Health, within the Connecting for Health programme. In the period of our study, resources were diverted from Third Trust to other NHS Trusts, so that Third Trust’s own timetables are adversely affected by the suppliers’ Connecting for Health timetables. Further, it proves very difficult for Trust staff to talk to the developers of their software, and access is only achieved when it becomes clear that timetables are slipping badly, and the Trusts insists on talking directly to software engineers.

5.8 Balancing Local and Generic Requirements

Some staff groups had greater influence over the design and implementation of systems than others. Within the sites this was often manifested as arguments for or against standardisation (by which we mean standardisation of software, or of clinical practices, or both). For example:

- As noted earlier, the early planning and testing of systems revealed the wide variation in working practices, even for apparently identical administrative processes, within Trusts. One view was that this variation could not continue, and would not be tolerated in any other type of organisation, the counter view was that customisation was necessary, partly to secure local support for implementation, partly because the reality was that practices were different, whatever the rights and wrongs of the situation;

- Clinicians’ requirements for audit trails had a substantial influence on the acceptability of component systems. In one of the sites the system was deemed “unsafe” as changes in patient records were not immediately visible on screens. Some clinicians felt safer with paper, as they could make and see changes immediately, rather than having to drill down though layers of screen to identify the source of the change in the record;

- At First Trust, individual wards wanted to customise visual displays, but this was set against managers’ views that displays should be standardised, so that staff working across wards would have the same view everywhere;
Successfully spanning boundaries between different staff groups could be difficult, especially where the systems seemed to improve life for some staff groups while increasing workload for others. For example, in one of the hospitals results alerts reduced medical staff time in checking their availability by phone, but increased workload for nursing and administrative staff that had to cancel the alerts.

The wider issue is that system suppliers and managers were constrained, because their systems could not be designed entirely around the needs of a small number of clinicians. In developmental projects suppliers (understandably) have a weather eye on future users, and are therefore keen to produce systems that would be acceptable to clinicians in other settings. In practice, therefore, local managers and informatics teams found themselves having to balance tailored and standardised features of component systems.

5.9 Negotiations Continued During Implementation

The implementation process did not end when a system was delivered to a Trust, or to pilot wards. Rather, the nature of the negotiations changed, with some discussions becoming more sharply focused. Experiences at First Trust provide a good illustration of the range of issues that came up in the early months of the ‘live’ use of the patient flow system.

One early issue following implementation was that the patient flow system did not mesh entirely with working practices on wards.

"I knew at the time we hadn’t done the business change, we hadn’t found out currently what people do. We hadn’t gone through that formal process of putting in a lot of time to that. Yes, we had sort of like regular...... we did like day sessions, half day sessions, invite and get as many people round but not particularly structured."

This was an important practical observation from the ground but, looking forward, in Chapter 9 we suggest that integration of IT with working practices might often be less-than-perfect. It is a moot point, then, whether First Trust could have prepared more effectively, or whether imperfect ‘fits’ between IT and working practices is the norm.

Once it was available, the equipment threw up a number of issues. Large plasma screens were used for visual displays in ward areas and in the Ops Centre. The positioning of these screens proved to be an issue – in some wards staff requested that they should be relocated after their original installation. Some wards requested additional screens, either for their convenience so that they could view the information from different locations on the ward, or on larger wards because they could not easily see bed locations on a single screen. PCs were also used to access the system: in some wards staff might have to log off one hospital system in order to
access the patient flow system. A great deal of effort went into ironing out these issues, involving both suppliers and the Trust’s project managers.

There was discussion, in advance of implementation, about using touch-screens so that the information could be entered or modified ‘by finger’ directly on the large screens. A decision was taken not to follow this approach, primarily because of concerns about access control. One manager was disappointed by this decision:

"I believe [the decision] was quite a bit of a let down for the staff, because I know from a technical point of view well you pick a mouse up and you do this, but actually when ... you're nursing staff or when you're anything else, and you have to go find a mouse ... it's the time, whereas if you've got an interactive screen, it's just de de de and you've done it, you've got it, and there aren't any issues."

In practice, staff access to the system was through PCs, with access controlled through the use of smart cards and passwords/PINs. This allowed the Trust to capture audit trails of the use of the system to be followed if necessary. The new work group and system were added in to existing Trust smart cards, so that staff did not have to use different PINs for different systems. The updating of smart cards caused some difficulties, as much work needed to be carried out – some cards required unblocking or activating and although over a thousand smart cards had previously been issued through the Trust, when the patient flow system was implemented it was discovered that a large number of staff members did not possess a card, having previously had no use for them. Additional smartcard issuing sessions were arranged, where identities and photos could be checked, including and information about these was circulated to ward managers encouraging them to ask their staff to attend. This work involved middle managers and IT security staff, as well as the staff themselves.

Other issues related to data – data quality, and how it was displayed. The patient flow system was dependent on PAS for the supply of basic demographic data. It became clear that the quality of patient flow data could only ever be as good as that in the PAS: and the PAS data, as in many Trusts, was incomplete, and could only be updated periodically (in a batch process), so that data in the patient flow system was at risk of being out of date or incomplete. There were also on-going discussions about the data should be shown on the display screens especially on the wards, and about the presentation of the data. The screens on the wards closely resembled the traditional ward whiteboards which they replaced:

"It’s people’s comfort zones because I think if you said to somebody, "How would you like that whiteboard to look if it was electronic?”, they’d start by saying "Well, it should look exactly the same ...". (Nurse)

But not everyone was happy with the screens when they arrived, and particularly with the amount of text:
"It’s the visual thing that is some people’s problem, not everybody has got the best of eyesight and they’re looking at it and they cannot determine what they want."

"We’re now in the situation where people have said “I can only deal with looking at 12 patients’ information on the screen” A 42 inch screen! – well that’s not a visual control display, that’s an essay!” (Nurses)

There were also discussions about other features, such as colour coding and the display of alerts. Some people favoured visual cues, such as the use of flashing icons, but others found this irritating. All of these issues led to discussions with both the Trust informatics team and suppliers.

Finally here, there was discussion of patient privacy and confidentiality:

"Information governance is a major issue ... we have a screen which anybody can see, but then again everybody can come along and see the white board. So it’s not that we’re creating a behemoth monster, but equally I’m very keen that we do not put identifiable patient information for ready consumption [on view].” (Consultant)

5.10 Concluding Comments

This chapter has focused on the on-going negotiations that took place about the component systems, and key strategic systems, in the course of 2010. It highlights the number and type of relationships that were necessary to design and implement systems, ranging from high level strategic discussions to detailed consideration of the presentation of data on screens. IT programmes involve on-going, parallel processes, operating at several different organisational scales. We have also seen that informatics teams had to balance project management – to ensure delivery – with a need to be flexible, given that everyone was learning as they went along, and also given that they could not simply manage projects, but rather had to develop and maintain relationships based on trust. We move on to the wider governance of design and implementation in Chapter 6.
6 The Governance of Projects and Strategies

6.1 Introduction

In Chapter 5 we focused on some of the systems that the three Trusts were implementing, and on issues raised in the implementation of informatics strategies. This chapter is intended to complement Chapter 5, by focusing on the governance of the projects and strategies at the sites. As we explained in Chapter 3, we were interested in the on-going relationships between the various stakeholders.

It quickly became apparent at the start of the project that many activities were taking place in parallel, involving different combinations of people. The chapter sets out the number and range of these activities, starting with informatics boards, project management, lines of communication with suppliers, the involvement of doctors and other clinicians, and developments ‘on the ground’ in wards and other locations. We note both the formal organisational structures and the informal relationships that were used to steer the projects.

6.2 Strategic Oversight

The formal arrangements for oversight of informatics strategies, and of individual projects, were similar at the three sites. All three had a top level board, which included senior informatics managers, general managers and clinicians. There were variations between sites when it came to other members. There was a PCT representative on the board at First Trust. At Third Trust there were representatives from the lead supplier, the SHA and Connecting for Health.

These boards met either monthly or every two months. As one would expect these boards discussed a wide range of topics, and were the places where agreements were reached and differences of opinion aired. At Third Trust, for example, the main board was one of the places where the problems with delivery were discussed openly, with all parties expressing views about the appropriate way forward. This was also the place where strategic issues were discussed. At Second Trust, the Trust had to decide which of its clinical information systems to develop further, and which to phase out:

".... the idea is to integrate [three existing systems] in a single portal .... I think there’s some harder decisions to make, I don’t think you can have three clinical information systems running in one organisation, but the political issues around that are enormous ....” (Clinician)
And, it was the place where informatics managers had to translate strategies into practical plans. It seemed to us, as observers, that there was no single ‘right’ way to develop or implement strategies, though many choices and decision points. How these are addressed would affect the final destination – in the space between vision and action there is space for negotiation, planning, mapping, and the many other activities. ‘Solving’ a problem may mean moving on, in thinking or in design, until more choices and decision points are revealed. One of our interviewees gave an example:

"Everybody absolutely accepts the vision as being the right one .... imagine you’ve got lots of different systems that hold different parts of the clinical picture about a patient, so a patient can occur lots of times on different systems and different clinical data [are] held about them. There’s got to be something common about those patients that enable you to link them together, to link the record together, and it makes absolute sense for that common numbering to come from our PAS system, because PAS drives the organisation, so if there’s any activity done here there should be a record of it, from an admin perspective, on the PAS system, but what that means is that PAS has got a numbering system that works and is effective and links all the different episodes together. So we need to apply that numbering system to the clinical system so that when this system talks to that one, you can identify that patient with its corresponding records over here, because you’ve got something that uniquely identifies those patients, and until we implement that unique numbering system within [one of the systems] we’ve got nothing that we can reliably link the patient record in [the system] to any other clinical system, or patient record, it just wouldn’t connect. So it’s really important that we introduce those numbering systems ... you’re back to what is the point of trying to do it until you’ve got these numbers in place ....” (Informatics manager)

6.3 Project Governance

The individual system projects were all led by an informatics project manager, who worked closely with a core multi-disciplinary group of staff and a project manager representing the supplier. The Trusts created a hierarchy of meetings, with project boards reporting to a main informatics board, and sub-project groups reporting to the project board. The project boards were responsible for early activities such as the preparation of business cases and overseeing the gathering of clinical requirements. Once projects were initiated, standard NHS project management methods were used, and project plans drawn up and used to manage timescales, and monitor any slippages or changes. Meetings were regular, typically weekly or fortnightly.

The board membership was carefully thought out:
"... we have the right people on the Board, we have some of the senior medical users, we have senior [clinical] people on the Board, and we have some big hitters, we have some influential people ... it’s really quite a good mix." (Informatics manager)

The Chair was carefully selected, from another part of the hospital, to be neutral in relation to the adoption of the system:

"I think one of the best things that make it work quite well is the Chair of the Board ... has no vested interest whatsoever, he’s just a very senior clinician who knows how to chair meetings and he’s quite a conciliatory kind of chap as well, and his opinion will carry great weight outside, purely because ... he’s somebody who does have a keen interest in its success. " (Informatics manager)

The project boards were the link with the Trust informatics strategy upwards and project management downwards. They were the bridge between strategy and implementation:

"The idea is that that project board owns the business case and is responsible for all the expenditure on the project, on the direction it goes, so if you remember at the last meeting ... there was some discussion about extending the scope of the project, because it’s not for me to make that decision, it’s for this group to make those decisions and I’ll facilitate, providing them that information, as much as I can” (Project manager)

"the project manager ... and other staff come under me broadly, but the more important part of my role I think is the link to strategic direction, because I’m heavily involved in development of informatics strategy ... but it’s heavily linked to the integration in the clinical portal arm of the strategy, and really I’m there ensuring it all stays on track ...” (Informatics manager)

Decisions that could only be made by the informatics board would be referred upwards from project boards. For example:

"[A manager] reported on issues and risks arising. A major concern is the lack of resources allocated to the project for interface development. There are competing calls on a limited resource ... This is affecting the ability to plan” (board minutes)

This particular issue was taken away by the project manager, who negotiated with the informatics technical team. The board later authorised a new plan and increased use of resources.

A further sub-team was added as the project progressed, to focus on benefits realisation. As noted in the internal audit report:

"Project staff are organised into 3 core teams (Implementation, Interface and Technical Infrastructure) based on the requirements of the key
deliverables, although a number of individual staff members are required to contribute to several key deliverables.”

Activities within the sub-teams are performed by a core group of staff in the implementation team but in different combinations depending on the task:

“And depending on what it is that’s enough you know you don’t always have to have a sit down and an agenda and everything, so it’s helpful to know, to get to know who does what and who the useful people are, and then by the same token you also get to know who it’s best to deal with via email or who it’s best to write things down for, whether you need to drive it through in actions on a log, and you know some people you ask for something you get it, there are other people that you have to ask a few times, and you might for whatever reason, whatever you want to call it, you might need to just write things down so you can say well I asked you three weeks ago and how are you getting on with this kind of thing.” (Project manager)

The sites used PRINCE2 project management, but it needed to be combined with other project assurance activities. Thus at one of the Trusts:

“What I am always keen on having is a level of project assurance. Now if you followed PRINCE religiously for product assurance you’d spend your life just managing this bit of the process. The way I do it is I tend to get internal audit involved, because they QA what you’re doing and make sure you’ve got sufficient levels of control … I like to do that at the beginning rather than for them to come along at the end, and say well actually, why didn’t you do so and so … So I always invite them to provide my product assurance to look at the structure and make sure we’ve got everything in place as we should. And they’re always quite keen at looking at the budget, as you would imagine, but we make sure that we’ve got sufficient history of what actually happened and so if anybody did want to go back and check then it’s sufficiently easy to find that information.” (Project manager)

At First Trust, in contrast, the arrangements were less formal. The Trust agreed a tight deadline for completion of the first phase of the project. It was a new product, but there was little time for distinct planning and design phases. Project managers from the trust and the suppliers worked closely together and met frequently, including meetings with the software developers, both at the Trust and at the suppliers’ offices.

In the very early planning stages of the project it was envisaged that a project team including end users would be created. This did not materialise, partly because it proved to be difficult to secure sufficient active clinical involvement (see below). Although there was no clearly defined project team which met regularly, the project managers arranged a number of meetings during the early stages of the project involving end users of the system and representatives from information services to discuss specific issues. Representatives from the suppliers and software developers attended some of these meetings. The lack of a project team or steering group was of concern to some:
"The missing bit as I see it is the ... project group, where decisions are made, where everybody brings what their needs are to the table and prioritises them, that group is missing - an operational group or a steering group." (Manager)

Some issues highlighted the tensions between adhering to timetables and ‘getting things right’. A programme manager from the Trust Quality Improvement team was allocated to support the project. This person had already been involved in work looking at streamlining the information required in patient flow and reducing the amount of phone calls and other requests and through this already had good contacts with the users of the patient flow system on the wards and the Ops Centre. They acted as a link between the project – both within the Trust and externally with suppliers – and these users and spent a lot of time with them, discussing their needs and preparing them for the project implementation. On the basis of this previous experience in the area the programme manager believed, that certain items of information, and in certain formats were essential to successfully improving patient flow. The system project manager saw their priority as achieving a working system, conceding that it would not be perfect nor complete, by the date limit set by the SHA (and thus not losing the funding they had allocated).

There were no business change professionals employed in the Trust:

"I think that’s something we’ve not done particularly well I think we’ve been very good at showing people how to use the system, what buttons to press and when to press it, but we’ve not been great at changing how people work, changing processes.”

"It’s a very specialist role. And I think you need people that are used to taking on that specialist role that can go out and talk to the right people in the organisation.” (Manager)

Others saw it as impractical:

"A. We don’t have in house capabilities for business change.

Q. But you would prefer it in house?

A. Well, you see that’s a really challenging one because it, you almost cannot because, for us at the moment, we have [another system] business change, we have patient flow business change, we’re going have a new PAS, huge business change, you know, we have PACS, significant business change, so we’ve got a lot of projects, many of which overlap so if you’re going for enough business changes support you have to have a huge amount for concentrated periods of time ... unless you’ve got people who are multi skilled and can do project management in one project and business change in another, which is challenging, and benefits realisation somewhere else, then you’re almost better off to buy it in.” (Manager)
Thus, business change expertise was bought in for the project from one of the supplier firms (as at the other Trusts, more than one firm was involved).

6.4 Interfaces with suppliers

We were struck by the length of the lines of communication with suppliers. A great deal of information was channelled through the Trust and supplier project managers. At times they looked like the organisational equivalent of a narrow funnel, with project managers taking in messages from the Trust and conveying them to the suppliers, and vice versa. It was difficult to see how this problem could be avoided: from the vantage position we adopted, it was clear that the IT projects required two large organisations to create a new interface with one another.

Beyond this, we were struck by the differences in the nature of relationships. First and Third Trusts are used as examples here, as being on the ends of a spectrum.

At First Trust, from the time that their proposal was accepted the enthusiasm of the software developers was evident:

"(compared with other software developers) the one thing that was clear from being involved with this one is that its a completely different feel to anything I'd been up against before…. there’s a very much a can do attitude which is quite infectious at one level because of the layers of bureaucracy that we’re used to dealing with in the NHS. It is quite refreshing ....Their approach was to have this sort of 'flood the organisation’ mentality, you know, get out there, walk the floors, speak to everybody.” (Clinician)

Supplier staff spent a lot of time on the Trust premises. Prior to designing the system they shadowed staff – primarily ward and patient flow staff – to gain an understanding of how these people might use the patient flow system (ie eliciting system requirements). As the initial development phase neared completion they gave demonstrations to groups of staff, where they encouraged people to voice comments and concerns. They also provided training on the system and were on site in large numbers to provide support during the immediate go live period, on the first two days of the system’s implementation. Throughout their involvement they were keen to maintain direct contact with system users, taking suggestions, problems and complaints.

The supplier’s approach seemed to Trust staff to have advantages and disadvantages. Our interpretation is that the suppliers faced organisations which did not have standardised working practices. Each ward, each team, had its own local standards. Thus one manager observed:

"It’s symptomatic of how [the supplier] approach things as well. They will go in to an area, like a ward, and say, 'How do you want the system to work?', and whoever they spoke to at that particular time, day and shift...
would tell them one thing, then they’d go to another ward and be told something else, and they’d go to another ward and be told something else, and ... then they’d bring those requirements together and deliver what they said the users want. Well, in a large organisation what users want is not necessarily what the organisation wants, there’s a real big difference sometimes.” (Clinician)

There were dilemmas concerning the nature and extent of user involvement in design processes, and how far it was useful to elicit user views:

“There’s always a dilemma between involving a lot of users in those discussions and actually keeping it to quite a discrete group because you get lots of people’s ideas and you end up with ... we got a point where we had a list of god knows how many things that people wanted it to do. So I think we just had to rein it back a bit and go back to ... the key principles upon which we decided the procurement and deliver on those before we started to look at bells and whistles and ‘wouldn’t it be nice’. “ (Manager)

The time pressures on the system’s initial development heightened these problems. It was not always possible to validate comments from users, to check that those comments were widely shared, and not off-the-cuff remarks:

“There’s only so much you can do though in nine weeks. You can go and talk to somebody and ask them what they need and that’s fab, you get an answer out of it from their perspective. What you don’t have time to do is to put it back in the pot and say, ‘is that what everybody needs?’” (Manager)

It was recognised that the supplier would want to ensure that the system could be used in other Trusts. This created another ‘natural tension’ relating to standardising work practices. To some extent this could be resolved by giving wards the ability to customise some screens:

“They’re going to give wards the functionality to set their own configuration if required. That’s how they’re approaching it now because they’re absolutely convinced that these wards need to be able to configure their own ... I think they think this is us that’s being awkward about this ... The wards are telling them they want lots of configurability on their own to tailor the system to individual ward needs in order to manage the patient flow on their ward. Which actually isn’t a bad thing, and maybe they’re right, they could take it to another hospital and that might be how they do it. What our Board is saying is, ‘I don’t want that because I think it’s a patient flow system and I think all wards work towards the same goal.’” (Manager)

"What [the supplier] are trying to develop is an all encompassing EPR for secondary care ... I can see the advantages of that at one level ... as you know, CfH have been trying to do that for a decade and haven’t really succeeded.” (Manager)
At Third Trust, as we have already noted, the document management system was not delivered. Some of the problems can be traced to the contract for the system. The contract is not directly held between the supplier and Trust – the contract is between the supplier and Connecting for Health. The software company had not encouraged clinical involvement in the design of the system: this would occur after an initial version of the system was delivered. This placed informatics managers in an impossible situation, having to make preparations for a new system without knowing what it looked like. In effect, they found themselves guessing how the system would work. This left both informatics staff and clinicians in an odd position. As one informatics manager put it:

"I think the thing that I think the clinicians haven’t quite clocked yet, is the contract isn’t between us and [supplier], the contract for both of these products is between CFH and [supplier], Therefore I have no contractual muscle whatsoever". (Informatics manager)

Whilst they had no ‘contractual muscle’ they were often left to explain the situation to clinicians. Gradually there was a distancing between the informatics team and suppliers. Pressure was put on Connecting for Health to start managing the contract more actively. Slippage creates practical difficulties on the ground, partly because the notes are being set up in the pilot department in a way that is conducive to digitisation – but the digitisation is not happening, so the organisational change has been made for a technology that has not arrived. There is a great deal of frustration, and an indication of the challenges of communicating about projects when they are delayed:

"There’s no point, there’s actually no point in selling this too soon ... this is a bit like never never land, you know, because you’ve been talking about this for the last two years and actually it still hasn’t happened guys, you know, is it ever going to happen? That’s one of the criticisms. So you’ve got to be careful with those staff who don’t really understand ... they think oh yeah heard all this before, pie in the sky, not going to happen, get on with what we’re doing." (Informatics manager)

6.5 Clinical Representation

One problem which affected all three sites was clinician representation. There was always a ‘committed core’ of clinicians who attended meetings regularly, and often spent considerable time on projects between meetings. Beyond this, though, sites reported that it was difficult to involve the wider body of clinicians. The importance of involvement was recognised:

"They’ve got to be involved in the implementation of it, because they’re using it and they know the issues etc, so you cannot implement anything like this just by taking IT and business change people and saying here’s a product we’re putting it in. That’s not the right way to go about it, so you’ve got to get these guys on board. They’ve got a day job, to an extent,
you know, you’ve got to be restricted by the time that they’ve got”.
(Informatics manager)

When clinically important issues did arise, they often focused on detailed aspects of the design of systems. At Third Trust a clinician found that it would be possible to edit patient notes after a consultation had finished. He felt that these legally binding documents should not be changed:

"... there was the issue, a few meetings ago ... there was the ability ... for anybody to be able to change that document ... that came up through us piloting it, and the fact that you could do that, and actually unless you then went back to umpteen screens or whatever you couldn’t see exactly what that change was or who’d made it or anything, there was no proper restriction, or audit trail. So that’s something that we picked up. "
(Clinician)

At one of the sites, the clinical director acknowledges the difficulty of persuading clinicians to take an active role in the development of projects:

"We asked for people to be involved, they say yes but then their attendance is poor. I’m not sure that everybody feels that they can give the commitment and the effort and the energy and the time I suppose.”

Even getting colleagues to express opinions is seen as problematic in some projects:

"I think that the risk is that although you give colleagues an opportunity to contribute they don’t and, they then whinge when they don’t like the output, my role is partly to control that whinging and partly to say well hang on a minute we did ask you to contribute and you didn’t.” (Manager)

Because of this and because of the poor attendance of medical members of the Project Board, they have found themselves in a position of being expected to make decisions of behalf of all medical clinicians. This is not a situation they sought:

"I think there’s also the risk that what’s actually happening is that more and more and more its kind of, “Oh, what’s Mr A’s opinion?” rather than me being a conduit. Don’t get me wrong, I’m not blaming anybody for that, but I think that is a risk ... I think that, if I could design it with a blank sheet, what I would want my role to be is to identify champions to be on projects, for them to engage, interact, seek opinion from their peers, feedback, challenge, throw paddies, you know, all the things that consultants are supposed to do and then for me to be, if you like, just overseeing from a clinical point of view how the projects are progressing, I think I’m getting sucked in more and more to the nitty gritty.”(source)

The main organisational response was to create clinical advisory groups. One reason for creating such groups was to ensure that clinical practices were improved:
"It’s clearly imperative that we make sure that in moving from manual process to IT based process that we are not either introducing or carrying over with us inherently bad practice, poor practice, and introducing risks ... it’s in [the programme board’s] interest that they have that group that can advise on those types of things". (source)

But arguably the main rationale for these groups was that they acted as a bridge between committed clinicians and the wider clinical communities in Trusts.

"And then generally speaking we tend to know amongst our clinicians who is interested in this sort of area of work and who’s got a bit of knowledge about it, and so you’d tend to invite those people. So that’s how it formed. Out in primary care we also knew that there is an interested GP out there, who has a good IT knowledge, takes some leadership roles in IT development out in primary care, so he was invited to join us.” (Clinician)

### 6.6 Work On The Ground

The implementation of systems also needed to be managed. A clinical member of a team noted that teams were put together before implementation started:

"I think in my eyes the implementation team are the people who are more clinical... have the clinical knowledge to look at how the implementation’s going to happen physically. Whereas the project team and the project board ... have more of a strategic view of the project and where it’s going and what’s going to happen ... the implementation team are actually the ones who are the doers. Who do not necessarily do everything themselves but they have the links with the clinical teams in order to pull in the people that they need at any given time.” (Clinician)

Links to other Trust professionals and groups have been made to get feedback during the evaluation phases of projects. This has involved showing the system in its early stages of development to medical and nursing staff. Members of implementation teams are responsible for making contact with pilot wards to flag up that the system is on its way, to identify issues and concerns, and to be the face of the project throughout pilot phases.

At Second Trust, for example, there were four “super-users” for the medicines management system – a doctor, a nurse, a pharmacist and a pharmacy technician. They were responsible for implementing the new system, and learning from the process of implementing on pilot wards, so that later iterations could benefit from early experiences. Over the course of the period of observation the group have commented on how their learning about the product and the process of developing the product has developed. Individual members describe themselves as being on a learning
curve, and feeling under pressures because they were finding out about the system as they went along.

"As expected it’s been a bit of a roller coaster. I think as you say we’ve all been on a learning curve, [the supplier] and ourselves”. (Clinician)

There were other preparatory activities:

"…held an e-prescribing day … to try and test the water and to try and get a bit more interest in the organisation. That seemed to be quite successful, we had about 80 local people came to that, a lot of expressions of interest…” (Clinician)

"We’ve had one event where we had a study day that involved a big cross section of people, clinicians, nurses, IT folk, pharmacists, to talk about what is we’re trying to achieve, to try and get a bit of a picture for where we’re trying to get to, we’ve then pragmatically used that and … said ‘we’ll run with this’”. (Clinician)

At First Trust there was extensive activity before and after implementation. The programme manager visited wards and the operations centre and spent time with people who would be using the patient flow system to discuss their views and experiences prior to and after its launch and to encourage its continuing use. There had been several IT projects implemented or piloted recently including order communications, electronic document scanning, out-patient check-in and electronic discharge letters. Although some staff members are able to cope with the range of new systems, others feeling overwhelmed with the number of changes:

"There are other projects going as well that we’re on with at the moment, they keep introducing a new system here and a new system there that we seem to be trialling at the moment … So yes there seem to be a lot of things coming through at the moment, but they all seem to be slotting in nicely together.” (Ward administrator)

"We’ve put a lot of systems in. We’ve put an order communications system in … We are in the process of converting all our case notes into an electronic document management system. I’m doing patient flow, there’s all sorts happening. And I mean sometimes when you go on those wards it’s like when we did the review of the patient flow and again the woes are, ‘I cannot cope with any more change. I really cannot cope with any more change’. And people get overwhelmed.” (Manager)

The importance of approaching staff personally in their usual working locations, rather than relying on meetings or e-mails was stressed by one of the interviewees

"… there’s an understanding that maybe we do have to go out on the shop floor. [Previously it has been] more about trying to get the staff out into meeting situations but, if you’re on a ward and you’re clinically working, or something happens, you’ve got you’ve got staff sickness, and even with
training, it can be quite difficult to get those clinical staff out of that ward area to undertake that and to play a part in meetings. My experience of working with ward managers, and sisters etc is emailing isn’t always the answer, because although some are very good at picking up their emails, some are not, and I find a good approach is to actually just physically turn up on the ward, and ask, ‘Are you free at the moment?’ ... you have to fit in with them. Maybe it is more time consuming but I think it’s a lot more productive.” (Manager)

A manager echoed the limitations of e-mail communications

"One of things I’ve found difficult is the long-winded emails really and ... the jargon that’s used sometimes about different functionalities and different phasing. And then being asked to comment on ... there’s 60 things that you’re commenting on at a time, it’s extremely difficult to keep on top of it really.” (Manager)

6.7 Concluding Comments

Our interpretation of the account to this point is that the sites were engaged in two key activities. First, and as commented on in Chapter 5, they were all steering in the same general direction, but were having to ‘solve’ problems continually in the course of the year. The visions were important in setting the direction of travel, and encouraging staff to keep going when they hit problems. While the overall ‘visions’ were important, though, turning those visions into real systems involved on-going, and often parallel, negotiations with a wide range of stakeholders.

Second, the key individuals involved in the projects relied on their reputations to secure support. There was no compelling scientific evidence about effectiveness of the systems, or instructions from the Department of Health or a professional body. Staff had not seen the systems at the start, and could not be confident that they would be delivered, or be useful. This left trust in colleagues as the principal reason to participate. To give just one example here, the super-users at Second Trust had key trust-based roles:

“IT is more difficult, because who does have a good IT background when you’ve worked in a clinical area? ... I suppose you could say I recognise as being someone who’s comfortable with computers and I think probably at a higher end of the competence range I suppose compared to some others ...” (Clinician)

If the benchmark is implementation, then the sites’ experiences varied greatly. At the end of this chapter, though, it seems useful to make two general comments. The first is that the projects depended on intensive efforts from large teams of people with very different backgrounds. They had to learn to trust one another, and we found evidence that they did so, even at Third Trust, when it became clear that the system would not be
delivered. The second is that the sites found it difficult to engage medical and nursing staff at both the design and implementation stages of projects - involvement was patchy and hard-earned. Combined with our observations about navigating and negotiating, we can say that the sites were able to create institutional arrangements that made design and implementation possible. The internal governance arrangements played an important role in maintaining project discipline. But it was striking how dependent those arrangements were on trust, and on the reputations of key individuals.
7 The Sites in Context

7.1 Introduction

Strictly speaking, regional and national bodies and the IT suppliers were outside our remit. We did not undertake any interviews outside our sites, and only observed supplier personnel – with their permission – when they attended Trust meetings. This said, it was impossible to ignore the influence of external bodies on the work of the sites. This short chapter is therefore designed to broaden the picture we are painting of the sites, placing them in a wider context. The material is presented under four headings – the influence of the National Programme for IT and Health Informatics Review, the SHA, the suppliers and implications for the work of the sites.

7.2 NHS National Programme for IT and Health Informatics Review

This was a very unusual period in NHS policy making, as two distinct IT policies were being promoted at the same time. As the material presented in the last three chapters shows, Third Trust aligned itself with the National Programme. Lines of communication were long, and did not help when deadlines came under pressure. The Trust was not able to speak to software developers directly until it was clear that there was a serious delivery problem. Before that, they were required to communicate via Connecting for Health and the management of the National Programme consortium – there were two ‘layers’ between the Trust and the developers. Third Trust discovered that it had little influence over the work of the consortium.

The experiences of the other two Trusts were rather different. Second Trust found the National Programme review of medicines management systems helpful, as it provided them with some useful analysis that was independent of suppliers. They also welcomed input from Connecting for Health on a specific issue, concerned with the details of designing interfaces between systems. This last example aside, there was relatively little direct contact with the Programme during 2010. Consider this observation from a manager at First Trust:

"No it’s completely changed over the last 12 months, so yes 12-18 months ago [there was] alot of pressure to get on to the national programme, roll out [the National Programme systems], when are you going to do it? All that seems to have gone ... it’s all backed off really. The IT section in the SHA over the last 12 -18 months have changed their messages completely. So 18 months ago plus, it was very much ”[First] Trust, when are you? this
is why you should be taking [the National Programme systems], you should be developing these plans, you should be looking at this, you should be doing that, you should be doing this!” Now it’s “[First] Trust you need to be making your own decisions about what you want to do” Talking about the national programme has not been as mandatory .... [before] there was no other ship in town, now it’s your own choice what you want to do.” (Informatics manager)

This change has had financial implications for individual trusts:

"But with that comes your own accountability, responsibility, and also your own spend, so the National Programme, they’re clawing back some money, they save money on renegotiation of contracts and things. None of that comes down to us. So the Treasury have saved some money but we haven’t."(source)

The 2008 Health Informatics Review was presented as an interim policy, designed to bridge the gap between 2008 and the arrival of National Programme systems. In practice it seems that two of our sites welcomed the policy, on the basis that it allowed them to procure and implement systems – to use the terminology of the Review - which they needed. As 2010 wore on, though, we noticed that thinking about interim systems was changing. Thus at First Trust, at the beginning of the project the view was that the patient flow was likely to be an interim system, and might be at some point be replaced by the National Programme developments:

"... as with the rest of the NHS, we thought at some point we’d move over to [the National Programme system], and the functionality and the feature set of the patient flow that went out for procurement would at some point probably be superseded by [that system].” (Informatics manager)

But as time went on the National Programme solution appeared less likely to arrive:

"[National Programme suppliers] talk a lot about patient flow and that sort of thing .... I’ve not seen them implement a patient flow system as we see patient flow, so they’ve done bed management but that’s not necessarily what we were after.”

Interim systems might, in practice, be permanent solutions.

7.3 Strategic Health Authority

We noted in Chapter 4 that First Trust received SHA funding for development of its component system. A manager from a local PCT sat on the main project board, representing the SHA. The SHA also promoted the acquisition of an integration engine: it sponsored its development, and offered resources and advice to both First and Second Trusts during 2010.

More generally, we think it is worth noting that the SHA encouraged Trusts to make explicit links between ‘mainstream’ NHS policies, such as those on
waiting times or quality, with IT policies. This might look like an obvious point, but it seems reasonable to say that historically, IT policies have been developed largely separately from other national policies. It may be that policy makers, and hence SHAs, have begun to think positively, and in some detail, about the role of IT in improving service delivery.

7.4 Supplier Relationships
We are not in a position to make detailed comments about the suppliers: to restate, the work of the suppliers was outside our remit. We were, though, struck by something that must be common in software development projects, but which does not seem to be referred to in the health care IT literature. Software firms tend to organise themselves in two ways, which seem entirely sensible, but which tend to increase co-ordination problems with NHS Trusts. The first is that they appoint lead managers, or co-ordinators. These managers in effect liaise with software developers, who may be located elsewhere in the country or – as at two of our sites – in another country. The second is that suppliers often work in consortia. In all three sites at least two firms were involved in design and development work. The result was that there were typically long lines of communication between – say – a team of nurses on a ward and the developers. We suspect that this point will seem obvious to any reader with a background in software engineering, but equally we have not seen reference to it in policy discussions, or in reports in the health care IT literature. While this report has highlighted the considerable co-ordination challenges involved within our Trusts, suppliers have co-ordination challenges to solve as well. The difficulties that can result were most evident in Third Trust, where the lines of communication seem to have been both long and inflexible, but we noted similar issues – though with different outcomes – at the other two Trusts.

7.5 Implications for the Sites
We felt that there was an issue of 'subsidiarity' in IT policy making. (Subsidiarity is a term that became popular a few years ago, when it was used to refer to the need to make sure that decisions within the EU should be made at the right level, eg EU in Brussels, national government, regional government, local community). It seems that the Health Informatics Review was helpful to Trusts. But equally, Trusts found themselves engaged in ‘brown-field internal policy making’ because they found themselves having to make strategic decisions themselves. Standards are a good example here, where a firm commitment to open standards at national level might have made conversations at Trust level easier, particularly when Trusts found themselves negotiating with suppliers about interfaces.

Local strategies had to take into account the current state of play within Trusts as well as build on changes that had occurred in the external IT policy environment. In the absence of a credible national delivery
timetable, the Trusts embarked on a "connect all" strategy (rather than the "replace all" strategy of the NHS National Programme):

"... [as I] got more into it ... and really appreciating that we just didn’t have any of [the systems we needed], made me realise we had to put those interim systems in because there’s a learning experience that goes with that, and that we needed to get that done as a matter of priority, we’re at 2014 for our timetable on NPfIT if it now ever happens, and I knew last year that ... we had to get an Order Comms system in, we had to get an electronic discharge advice note in....” (Informatics manager)

This had further effects. For example, if sites were implementing national systems, they might not have to identify organisational and clinical benefits for systems. But this would not do at Trust level, because IT investments are just like any other investment and require business cases.

The delicate balance between deciding to go with national or interim developments is illuminated below:

"Why would I want to spend half a million pounds that I could re-invest in something else, if I could have a national solution? ... I have long been sceptical as to whether this country will ever get [integrated patient record systems], and my strategy is based on that. So my interim is an interim which might well be the long term, to be perfectly honest about it. However if NPfIT is still there in 2014 and there is still a national funding pot available why would I not want to take advantage of that? And if they have resolved all the Order Comms problems and it’s working like a dream, why would I not want an integrated system where you went in and it was your PAS and it was Order Comms and it did A B C and D as well? ... I cannot wait for jam tomorrow anymore” (Informatics manager)

7.6 Concluding Comments

The purpose of this short chapter has been to draw out a number of points about the influence of the wider environment on the work of the sites. We can say that the NHS National Programme had a major influence on work at one site, but not at the other two. Conversely we can say that the Health Informatics Review substantially influenced two sites, but not the third. The perception of the policies seemed to shift during 2010, as sites concluded that the National Programme systems were still some way off. There was an important practical consequence, namely that we can also say that the SHA directly influenced some of the work programme at two of the sites, via the patient flow and integration engine projects. We note that suppliers also face co-ordination problems, which appear not to be recognised in academic and policy discussions. And finally, we note that the Trusts found themselves developing policies – and implementing systems – which arguably might have been developed elsewhere.
8 REVIEW OF THE FINDINGS

8.1 Introduction

In this chapter we summarise the findings from the last four chapters, and then return to the three study questions that we set out in Chapter 1. It is worth re-iterating the key strengths and weaknesses of the study design we used, set out in Chapter 2, sections 2.4-2.6. The main strength of our case study design was that it gave us confidence in our findings, summarised below, because they pass two ‘tests’. The first test is that the material presented in the last four chapters corresponds to the activities at the three study sites – it is a faithful account of their thoughts and actions. The second test is that the accounts are coherent: the themes fit together into an overall account that makes sense, both to us and to the study sites.

To set against this, the main weakness of the study relates to its generalisability. It is simply not possible to judge how far the experiences of the three study sites are representative of the work of similar teams in other parts of the NHS. As we noted in Chapter 3, the literature on implementation of large scale IT systems in health care settings is small, and does not allow us to place our findings in a wider context.

8.2 Chapter Summaries

Chapter 4

A number of hospital-wide systems already existed in the three sites, just as they do in many other hospitals, including Patient Administration Systems (PAS), and order communication and pathology results reporting systems.

The sites were implementing individual systems – component systems – which were used across large parts of each site. One was a new medicine management system, designed to support the safer administration of drugs to patients on wards and eventually in clinics. In the other sites the new systems were concerned with bed management and the scanning of paper patient records. Each system was developmental, essentially an R&D project. This may reflect the reality on the ground, which is that most hospitals have implemented some component systems where there are established solutions – but there are key applications, like those studied here, where no off-the-shelf product is available, or is available but unaffordable (eg a US-developed system that is deemed too expensive in the NHS). , so the systems studied here were new hospital-wide component systems. At the same time, these components were part of a broader strategic programme, aiming to link the component systems together. These programmes, similarly, were in effect large scale R&D
programmes – directed, co-ordinated, but also open-ended, in the sense that there was room for negotiation about the configuration of key elements of Trust strategies.

Chapter 5

Chapter 5 focused on the on-going negotiations that took place about the component systems, and key strategic systems, in the course of 2010. It highlighted the number and type of relationships that were necessary to design and implement systems, ranging from high level strategic discussions to detailed consideration of the presentation of data on screens. IT programmes involve on-going, parallel processes, operating at several different organisational scales. We also saw that informatics teams had to balance project management – to ensure delivery – with a need to be flexible, given that everyone was learning as they went along, and also given that they could not simply manage projects, but rather had to develop and maintain relationships based on trust.

Chapter 6

Our interpretation of the account to this point is that the sites were engaged in two key activities. First, and as commented on in Chapter 5, they were all steering in the same general direction, but were having to ‘solve’ problems continually in the course of the year. The visions were important in setting the direction of travel, and encouraging staff to keep going when they hit problems. While the overall ‘visions’ were important, though, turning those visions into real systems involved on-going, and often parallel, negotiations with a wide range of stakeholders.

Second, the key individuals involved in the projects relied on their reputations to secure support. There was no compelling scientific evidence about effectiveness of the systems, or instructions from the Department of Health or a professional body. Staff had not seen the systems at the start, and could not be confident that they would be delivered, or be useful. The internal governance arrangements, including project management, played an important role in maintaining project discipline. But it was striking how dependent arrangements were on trust, and on the reputations of key individuals.

Chapter 7

As we have just seen, in Chapter 7, the NHS National Programme has relatively little direct effect on two of the sites, but a major effect on the third. Conversely we can say that the Health Informatics Review substantially influenced two sites, but not the third. The perception of the policies seemed to shift during 2010, as sites concluded that the National Programme systems were still some way off. We noted that suppliers also faced co-ordination problems, a point which appears to be under-estimated in academic and policy discussions. And finally, we noted that the Trusts
found themselves developing policies – and implementing systems – which arguably might have been developed elsewhere.

8.3 The Study Questions Revisited

In Chapter 1 we posed three questions:

1. What is the range and size of interim shared health data projects undertaken, and why are particular systems selected for development?
2. How do informatics managers in NHS organizations reconcile the demands of clinicians, general managers and others in reaching decisions about interim IT investments?
3. How do hospitals combine systems recommended by the National Programme with systems selected to meet local priorities, or already existing systems?

We are now in a position to address the questions.

1. The range and size of interim projects

Our evidence shows that the three Trusts were all taking on a number of projects in parallel, implementing new component systems and working on integration strategies. There are two ways of expressing the ‘range and size’ of the projects. One is through the range of people involved in the procurement, design and implementation. Individual projects, and hospital strategies, involved a number of distinct groups – informatics teams, clinicians, project managers, senior Trust management, software developers working for suppliers and the SHA and/or Department of Health.

The second expression of range and size is the number of staff who will have to use, or are otherwise affected by, a new system. In all three cases, many hundreds of staff would be directly affected by solutions – the ward nurses at First Trust, many doctors and nurses at Second Trust, and the majority of clinical and administrative staff at Third Trust. So, even though we focused much of our attention on individual systems, each of them involved many areas of their Trusts – they would link together many hitherto separate groups, using a single system. The informatics strategies further emphasise the scope of IT projects and programmes at each Trust. IT was an integral part of the Trusts’ overall strategies, and was intended to influence working practices throughout them.

2. How do informatics managers reconcile demands?

We can make four observations about this question. First, all three Trusts aligned themselves with Department of Health policies. For First and Second Trusts the main policy in the period was the Health Informatics Review. Third Trust aligned itself more closely with the NHS National Programme for IT. In all three Trusts, alignment with national policy had two advantages. One was in managing external relationships: while it was perfectly possible to implement systems that were not part of the National
Programme or the Clinical Five, it was simply easier to talk to the SHA or Department of Health if you were.

The other advantage was internal: compliance with national policies trumped other claims on IT budgets. Informatics teams were able to reinforce this effect by gaining the support of Trust Boards for their strategies. So, one way of reconciling competing demands was through a combination of complying with national policies and securing the support of Trust Boards.

The second observation is that informatics managers – and indeed the project managers who worked with them – were part of a complex network of stakeholders. Adopting an institutional perspective we can say that informatics teams, and the project managers who worked with them, were not in a position to manage projects. Rather, they used standard NHS project management methods, but they did so in order to steer projects in their preferred direction. That is, some aspects of projects were fixed, while others were negotiable. On the one hand systems had to be designed and implemented, and integrated with other systems. On the other, the projects were explorations of the unknown, and managers could not directly control key stakeholders, notably the developers and suppliers. It is worth stressing that these projects depended on trust, and that the trust relationships extended across each Trust (pardon the pun), from Boards trusting informatics teams to ward staff trusting their line managers and project managers. Even though the sites had different experiences with their systems, we observed people from different backgrounds, some of whom had never met before the projects started, learning to trust one another.

Third, as implied in the second observation the sites were steering towards an uncertain destination. It was as if the general direction of travel was clear, but the precise nature of the destination was not. One day there may well be single patient records, but as a result the discussions and negotiations covered a wide range of problems, from the most granular – the colour of an alert on a screen – to the large scale, eg the ways in which major systems would be integrated.

The relevance of this point is that the uncertainty about the destination influenced the approaches that the managers took. They could not simply promise to deliver systems. Rather they ‘invited’ colleagues to work collaboratively, on the basis that only collaboration could produce a usable system. Once they had committed to the journey, they were committed to solving any and all problems as they arose. One result of working in this sort of environment was that timetables were difficult to keep to – there was little managers could do if deliveries were promised and did not arrive, for example. In short, part of the art of management involved maintaining project discipline on the one hand and maintaining commitment when things were going badly on the other. On this view, flexing timetables and the details of the systems to be delivered was understandable. Equally,
once a team agrees to put back a deadline, it is in a risky position. Again, we observed the importance of developing and maintaining trust relationships: relationships are bound to be tested in health care IT projects.

The fourth and final point is that, again as hinted above, there are limits to the ability of any team to manage the complex web of relationships in IT projects. As we noted in Chapter 5, some groups were more vociferous than others, and could influence the direction of projects substantially. There was a delicate balancing act here. Clinicians who were prepared to engage in projects bore risks personally, alongside the other stakeholders. At one of the sites it was suggested that a component system project could affect a clinician’s career: if he supported it and it failed, his reputation would be damaged.

3. How do hospitals combine systems?

All three sites believed that integration was desirable. It was recognised that, if they did nothing, disconnected component systems and paper records would be the way of things for the foreseeable future. Clinicians could not access data in some systems, because those systems were marooned in departments. The strategic programme would, they anticipated, result in systems that allowed clinicians to access data from a number of component systems, eventually on a single screen.

Our evidence suggests that component systems, and the strategic programmes they are part of, are usefully thought of as developmental, or perhaps better as learning, processes. What is more, the learning takes place in several places in parallel, surrounding each component, so that learning is distributed around an organisation. Practical realities complicate strategic programmes. There are resource constraints, the effectiveness of component systems is not known, and there is a need for a great deal of discussion and negotiation. Indeed, one of the most striking features of the work at the three sites was that all parties had to co-ordinate with one another on a wide range of issues, some apparently minor – where a data item should be placed on a screen – and others major, such as whether a component system was acceptable to clinicians at all. (This is consistent with reports from other countries which show that HIT integration, while intuitively desirable, is difficult to achieve and involves extensive negotiation about fine details.45) Third, implementation unfolds over many years. The process is so long that any ‘final’ system may be very different from the original strategic plan, partly because the plans themselves develop in the light of experience, because the technological options change, and because organisational demands on information systems change over a period of years.

Finally, we can place these observations in a wider context. All three sites had, or were developing, integration engines – part of the SHA’s IT strategy. If you live in a health service environment this point might seem
unremarkable. Hospitals have many established systems in wards and departments, and the obvious thing to do is to link them together in some way. But, a glance at the literature on organization-wide systems, or at current debates in software engineering, shows that the incremental, integration engine approach is not typical. Enterprise systems, where a single vendor provides an integrated suite of systems, are the norm in other sectors. Understanding why health care seems to be unusual is beyond the scope of this project – we could not answer the question without studying enterprise systems as well – but we present arguments which might explain why integration engines might make sense in health care in Chapter 9.
Part Three

9 Interim Realities

9.1 Introduction

In this chapter we explore the implications of our findings, summarised in Chapter 8. Our findings echo the thinking of writers in informatics such as such as Orlikowski, and in network governance frameworks more generally. But we think that this would only partly explain the findings. The findings lend support to the contention that institutional analyses underestimate the effects of, or just ignore, information technologies. The purpose of this chapter, as noted in section 5 in Chapter 2, is to fill in the overall account by discussing the systems themselves. Our sites were, for the most part, developing rather than using solutions, and we do not have enough empirical evidence to do the filling in ourselves.

Instead, in this chapter we set out conceptual arguments that we developed in the course of the study, and which are presented here as an accessible account of the ways in which large scale systems develop, focusing on the technologies rather than on the people working on programmes and individual projects. We suggest that our findings are consistent with Arthur’s account of technology innovation, which emphasises the dynamic nature of the interactions between technologies and the domains they encounter. In this view, information technologies are institutions too, and ones where the ‘fit’ between a technology and a domain – such as health care – can be good or less good. In the case of health care our evidence, and that from other studies, suggests that political and technological considerations make it difficult to achieve a good ‘fit’.

We argue that, if we consider the ways in which IT systems are likely to develop, then for the foreseeable future, health care organisations will be implementing interim systems. Their everyday reality will be managing and developing interim systems, rather than working confidently towards well defined end points. In the next section we expand on Arthur’s arguments, and then in Sections 9.3 and 9.4 we reflect on their implications for health sector IT systems. We cannot stress enough that the arguments presented here are offered as food for thought, and not as firm generalisations from the experiences of the study sites.

9.2 Encounters With Technologies

Imagine, for a moment, that you are an informatics manager, and have just been handed responsibility for health IT policies for a region or a country.
You might start by asking some simple questions. Where are we at the moment? What are we trying to achieve? The answers might lead you back to some of the material in Chapter 3: many systems have been successfully implemented, but integration of those systems remains a challenge.

You face a number of design challenges, including how to integrate a number of systems, particularly when several of them are still essentially R&D initiatives, with development being undertaken by several firms around the world. In some cases, none of the firms involved is based in England. You are aware of the 'lock-in' problem, where early decisions can consign you to sub-optimal designs if you get them wrong. To make matters even more difficult, you realize that health care delivery is changing all of the time. This has implications for individual systems and your overall design.

To take just one example, very few IT solutions currently support joint care planning, where clinicians and patients agree on a care plan for the next year. Somehow, you need to ensure that existing and future systems support care planning. The target keeps moving.

Your instinct is to use existing solutions where you can: attempts to provide integrated solutions have not worked, and hospitals and other organisations have a very large installed base of systems. The only realistic option is to link together the existing patchwork of systems, and to add new systems as they become available. This is not a standard engineering or project management problem. But you need to control, or at least steer, IT developments. You have little hope of influencing the myriad software engineers, network engineers and others directly, even though they are making some key decisions in practice. Your best hope is to devise, and enforce, regulations that influence their decisions – you need to be a draconian standard setter. But this can only be part of a solution. You are still stuck between the rock of demands for concrete solutions (eg shared patient records) and the hard place that is the impossibility of knowing the future, the direction that technology will drive you in. Standards can help, but cannot help you see into the future.

Then, one morning, you realize that you are thinking about the problem the wrong way. Even though you look like you are responsible for IT policies and strategies, you simply cannot be in practice. One reason why is suggested by Arthur (2009). One of Arthur’s arguments is that many of us have been thinking the wrong way about another problem – about the nature of innovation. The standard view is, roughly, that new products or services are developed in a particular setting, and are likely to diffuse if the price is right. The diffusion of one technology can lead to structural changes in other industries. Just think of the effects of the Internet on the music industry, books and journalism.

Arthur argues that this explanation, while basically correct, is incomplete. He believes that economies encounter new bodies of technology rather than adopt them, and new combinations of technologies result from the
encounters. He gives the example of the banking industry encountering computation in the 1960's. Activities drawn from banking, such as accounting procedures, merged with some known computing approaches, notably data entry procedures and certain numerical and text processing algorithms. When brought together these created new functionalities, which we might term digitalised accounting. The result was a commingling of procedures from banking with procedures from computation that created new processes formed by combinations drawn from both.

Such commingling is true of all ‘adoptions’. Typically, as domains evolve, the understanding of problems deepens, technologies develop, and practices become entrenched. Elements of technologies that function poorly or are missing are worked on. (The historian of technology Thomas Hughes called these spaces ‘reverse salients’, conveying the idea that people mobilize resources to colonise them\(^5\)) When new bodies of technology spread through an economy, old ones fall apart. In health care, new IT solutions may lead to the possibility of delivering services in new places, eg outside rather than inside hospitals. The current rationale for developing and maintaining departmental systems is challenged, partly because some patients will be receiving services in their own homes. Thus there is a sort of evolution taking place, but it is in part purposeful, and so different in kind from ‘blind’ Darwinian evolution. It is possible that both clinicians and technologies are adapting to one another, purposefully.

Arthur further argues that some technologies do not go through this cycle. Some disrupt development cycles by reinventing themselves, by changing their character every few years, and finding new application areas. To use his term, they morph. Computing, particularly where it meets mobile technologies, provides a good example of morphing. This tendency to morph produces sub-domains – such as social networking - and the rate of change makes technologies look as if they are alive, rather as ecosystems seem to have lives of their own. In this view, technologies are not collections of objects linked together, with a fixed architecture. Rather, they have properties that look more like mini-ecologies: they are networks of functionalities. When this happens the body of technologies cannot be neatly defined. And they vary from place to place and time to time.

Top-down design is impossible in this situation. Much is unknown (or unknowable) about the environments within which new technologies are developing, and Arthur argues that:

1. The challenge is not to solve problems rationally. It is, rather, to make sense of an undefined situation, to interpret it, and turn it into a problem that can be dealt with;
2. Sense making involves bringing together loose alliances to ‘create something’;
3. More generally and abstractly, assumptions about order, closedness and equilibrium are giving way to open-endedness, indeterminacy and the

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Project 08/1803/224
emergence of ‘perpetual novelty’.

Innovation, like organizational life generally, is social, fluid, open-ended. Over and above this, he gives us a general account of technological innovation, and we can use it to evaluate developments in health care. It seems reasonable to think about a series of encounters between health care and the digital world. Some encounters have gone reasonably well, others less well, and there are ‘reverse salients’ where services do not currently exist.

You brood on what this means for you, and you have some thoughts. The first is that you are responsible for a problematic set of encounters between health care and IT. In contrast to Arthur’s accounts, encounters between health care and IT may simply not go very well. This might help to account for continuing frustrations with IT. The encounters were problematic twenty years ago and remain problematic today. Evidence suggests that, even when systems are successfully implemented, close inspection shows that the ‘fit’ between clinicians and technologies is imperfect. ‘Work rounds’ are evidence of this imperfect fit: digital services will sometimes fit clinical work like a glove, but work rounds, or imperfect fits, seem to be usual. In short, Arthur’s arguments have intuitive appeal, as long as one takes the view that health care-IT encounters are problematic.

Another thought is that Arthur’s account raises questions about policies that assume that specific technologies – notably integrated patient records – are realistic. In health care, as in other industries before it, developments are occurring in many places at once, in a largely un-coordinated fashion. The many designers working in parallel push forward a domain, technologies change and improve over time, and the result is innovation. In the case of modern IT solutions, change may not be step-by-step, but can come about rapidly though purposeful problem-solving. It is difficult to see how to harness the efforts of large numbers of designers, around the world, inside firms large and small. Innovation will take us where it takes us – and not necessarily towards particular, planned solutions. So, if health care-IT encounters were more fruitful, the outcome would be impossible to predict with any confidence.

### 9.3 Studying Technologies and Organisations

Our final point is this chapter concerns the focus of our study. As we noted in Chapters 2 and 3, our early thinking was influenced by institutional theorists. As a result, our field research focused on the relationships between the various groups involved in the implementation of Trust informatics strategies, and in the design and development of individual systems. We sought to explain the progress made at the sites principally in terms of the organisational processes that we observed.
This said, throughout the study we felt that we were overlooking something. This chapter is our attempt to articulate what we were overlooking, namely the technologies themselves. Arthur encourages us to focus on technologies, on how they evolve. For us, this highlights an important divide in the literatures we discussed in Chapter 3. On one side are authors who focus principally on the social and organisational processes involved in IT implementation and use, including Ciborra, Hanseth, Orlikowski and others. Our study adds to the empirical literature in health care in this broad tradition.

On the other side of the divide are authors who explicitly address questions about the technologies themselves. They are of two types. Arthur thinks like an engineer, and traces the ways in which engineering solutions develop over time. Pollock and Williams (who were mentioned in Section 3.6) are sociologists. But they are directing us to the same point: it is important to understand the ways in which technologies shape behaviour, and you can only do that if you study both technologies and people.

This leads us to the same point that we arrived at in the last section. That is, in common with our imaginary informatics manager, we are interested in the technologies themselves, and are struck by two features of IT developments at our study sites. They involve extensive negotiation, with the result that the end products cannot be specified in any detail in advance. And, they may or may not ‘fit’ clinical practice closely – reminding us of Tjora and colleagues’ observations in Chapter 3. If our sites are at all representative, we suggest that the increasing penetration of, and integration of, IT systems into clinical practice will lead towards an ‘ecosystem’ of the kind described by Arthur. But, unlike the ecosystems that we have all become familiar with – such as the iPhone/iPad environment – the IT solutions will not always ‘fit’ clinical practices closely.

### 9.4 Interim Realities

The arguments presented in the last section hint at a broader point. We suggest that informatics teams, and the clinicians, managers and suppliers they work with, are dealing with ‘interim systems’. Nobody knows, at the moment, what EHRs will look like when they are available - what ‘final systems’ look like, should we ever get them. Moreover, it seems possible that the ‘fit’ between health services and IT may be more problematic than in other sectors, such as banking or insurance. That is, it is quite possible that the fit will always be imperfect.

The term interim is our attempt to capture a number of ideas:

- In England, interim systems have had a particular meaning. They are the systems that NHS hospitals are implementing in compliance with the Health Informatics Review. There is no assumption that they are all that hospitals need – they are not complete solutions – but they are important components of any hospital strategy. Even though we don’t
know what EHRs look like, they will depend on key component systems, which can be implemented while we work out the right general direction of travel.

- Interim systems are bridging systems between current systems and the as-yet-poorly understood future, more integrated, solutions.
- Interim systems are useful for a period of time, but are then superseded for some reason. One way this can happen, suggested by our findings, is that a system is implemented as an interim measure, perhaps to fulfil a pressing need, but then it becomes permanent, either because it is useful or because there is no money to replace it with anything else.
- It is also possible that integration strategies turn permanent systems into interim systems. Component systems may have been implemented in a single department in a period before integration was considered likely or feasible. Once integration policies begin to be implemented, a valued departmental system may turn out to have a relatively short life ahead of it, particularly if there are other systems that do similar jobs elsewhere in the hospital, which are likely to be adopted as hospital-wide solutions.
- Implementation of hospital IT strategies takes many years. By the time the main components have been implemented, a combination of technological developments and changes in organisational needs for HIT mean that new components are needed, and existing ones may no longer be needed.

Our aim, in listing these different ways of thinking about interim systems, is to make the point that ‘interim’ may be a natural state of affairs. It encourages us to look closely at the roles that informatics managers and project managers have to play. They have to make difficult judgements about the future – which way IT will develop, what the hospital will need in 3 or 5 years’ time. They cannot simply order systems, but have to enter into complex negotiations with suppliers, clinicians and others in order to get systems agreed and implemented. And, even then, the encounters between health care and IT may lead to far-from-perfect solutions. The electronic patient record may therefore be an unhelpful idea - a technology to be aimed for - obscuring a more appropriate objective, concerned with the development of an ecosystem, within which systems can be linked together progressively over time.

### 9.5 Concluding Comments

In this chapter we have focused more on IT systems than on the organisational processes involved in their design and implementation. We have suggested that the NHS and other health systems are slowly developing IT ‘ecosystems’, and that for the foreseeable future those ecosystems will be composed of interim systems, where the systems themselves are developing, and where relationships between systems will also develop over time. That is, IT systems are likely to contribute to the dynamic uncertainty of health systems over the next few years.
10 Implications for Research, Practice and Policy

10.1 Implications for Research

Our findings have the following implications for research:

- We are struck by the dearth of studies of large scale IT systems in health care, given that these systems are of the most interest to policy makers;
- We also note the small numbers of studies which explicitly take account of the effects of technologies on behaviour;
- Our experiences raise questions about the value of experimental studies of IT systems. They are ever-changing, span many settings and professional groups, and are not ‘stable’ enough to study experimentally.

10.2 Implications for Practice

Our findings suggest the following implications for practitioners:

- IT projects involve – as the title of our report suggests – steering, negotiation and adaptation. Experienced managers will be aware of this point, but our findings suggest that the uncertain nature of design and development comes as a surprise to many clinicians;
- The scope and scale of the challenge of modern informatics projects is easy to underestimate. Our findings offer support for the importance of leadership, communication and other pre-requisites for any successful change programme. But in IT projects additional challenges are posed by the numbers of interested parties involved in any IT project, and the inherent uncertainty about the systems that will result;
- Trust between the various parties is an essential pre-requisite for IT projects;
- Individual NHS Trusts have, in effect, been developing their own standards, particularly for interfaces between proprietary IT systems. This seems, to us, to represent a poor use of local staff time.

10.3 Implications for Local IT Policy Making

If we follow the line of thought we have set out in this report, we can suggest that IT policies typically rest on three key assumptions, about institutions, innovation and standards.
Institutions

Much discussion of the value of IT, in both academic journals and the general media, is technology-driven. Much of this discussion implicitly assumes either that there are no political problems - there are plenty of statements to the effect that the benefits of digital networks are self-evident - or that any problems can be solved relatively easily. The evidence from our research, taken in tandem findings from other studies, casts doubt on this belief. Our findings suggest that, when local teams are required to develop solutions that involve clinicians, managers and informatics staff working in partnership, they have to negotiate solutions with one another. These negotiations can go well or less well, but even when they go well the outcome is not pre-determined.

Innovation

The value of Arthur’s arguments in Chapter 9 is - we hope - evident in relation to current thinking about IT and innovation. Arthur is giving us pause for thought, suggesting that we cannot simply assume that new systems will appear. Our empirical evidence supports this view. It is worth recalling that two of the systems we studied, bed management and medicines management, might be regarded as ‘core’ hospital IT systems, but there were no established commercial solutions available.

We can also make a broader point here. Local decision makers cannot rely on the idea that large scale IT systems will transform health care. In the short term, it seems that the realistic way forward is the step-wise strategy we observed at our sites. Even though (more technologically integrated) enterprise systems are used in other sectors, the nature of the institutional relationships in health care suggest that creating integration engines, and adding new systems over time, is more realistic for NHS Trusts at present.

Standards

The three sites made strategic decisions about which systems to link to which others, but without knowing what the final result would look like. They set off on a journey, with a broad idea of where they were heading, but having to think on their feet all the way.

One interpretation of these observations is that informatics managers responsible for sizeable geographical patches in the new NHS arrangements should encourage an open, developmental approach to implementation. Another, and the one we stress here, is that the three sites had to negotiate over standards - negotiating with one firm in order that another firm could access its data from its own system, developing protocols for standard activities (eg the format of discharge letters), and so on. This seemed, to us, to result in duplication of effort, and there is also a role for locality managers to act as guardians of local standards.
In summary, NHS hospitals would benefit from two clear steers, about sending clear messages to individual NHS organisations in a locality about the ‘key’ systems they should focus on, and in setting appropriate standards, covering inter-operability, security and other topics. That is, managers responsible for IT across a locality can set a general direction of travel, and provide clear guidelines that will encourage both NHS organizations and suppliers to create, over time, an infrastructure where the technological task of linking data and systems together is much easier than it is today.
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Appendix 1 – Participant’s Letter

Centre for Health and Social Care
Institute of Health Sciences
Charles Thackrah Building
101 Clarendon Road
LEEDS LS2 8LJ

Dear [Name],

We are writing to ask for your help with this research project which aims to improve understanding of IT investment decisions within the NHS. As part of our work we wish to interview a number of managers and professionals who represent key members of staff involved in the development or use of IT systems.

We have attached a study information sheet which gives more information about the study and what participation involves. We hope that having read the information sheet, you will agree to participate.

We will call you in the next few days to discuss this but please contact us if you have any immediate queries.

Yours sincerely,

[Name]
Research Officer

Professor Justin Keen
Chief Investigator
0113 343 654
j.keen@leeds.ac.uk

These paragraphs have been deleted.

The interview will take about an hour and will be arranged at a time and place of your convenience. We will follow a flexible topic guide and explore the areas described in the information sheet about the planning and development of IT systems. With your permission, we will make an audio recording to ensure accuracy. What you tell us will be confidential to the research team and we will not identify individuals’ contribution in our report.

It is up to you to decide whether to take part. If you agree to be interviewed you will be asked to sign a consent form, but you will be free to withdraw at any time without giving reasons.

Letter for participants V2 16 Nov 2009
Appendix 2 – Staff Consent Form

Department of Health and Social Care
Leeds Institute of Health Sciences
Charles Thackrah Building
121, Clarendon Road
LEEDS LS2 9LS

Trust number:
NHS staff member identification number for this study.

INTERIM-IT: SYSTEMS-IN-THE-NHS:
INFORMATION-SHEET

CONSENT-FORM

Name of Researcher:
Professor Justin Keen/Dr. Paul G. Demester/Mrs. Jeanette Moore/Mrs. Rose Peacock

Please initial box:

1. I confirm that I have read, and that I understand, the Participant Information Sheet, dated ................. for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time from the interview, without giving any reason.

3. I consent to the interview being audio-taped and the data collected to be stored at the university for 7 years, then destroyed.

4. I understand that any quotations used in writing up the study findings will not be identifiable attributed to me.

I agree to take part in the study.

Name of Participant → Date → Signature

Name of Person taking consent (if different from researcher) → Date → Signature

Researcher → Date → Signature

1 copy for NHS staff member, 1 for researcher

16.10.09

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Appendix 3 – Study Information Sheet

INTERIM IT SYSTEMS IN THE NHS: INFORMATION FOR PARTICIPANTS

This project aims to improve our understanding of interim IT investment decisions within the NHS by studying the dynamics of design and implementation of systems intended to facilitate electronic sharing of patient data. It is being carried out by a team of researchers at the University of Leeds, funded by the National Institute for Health Research Service Delivery & Organisation Programme (SDO).

Background to the research

Aspects of the NHS Connecting for Health programme have not progressed as quickly as people would wish, especially in acute hospitals. A Department of Health review of informatics in July 2008 recommended interim initiatives across different IT systems, care providers and care settings ahead of the delivery of national strategic systems. Local sites are now actively considering interim solutions, which can range from specialised departmental to hospital-wide systems and may include introducing interdepartmental or cross-sector standard templates for shared care.

The aims and focus of the study

The aim of the study is to capture the decisions about interim IT investments and deployments that managers and clinicians make over the course of a 12-month period.

We are interested in exploring:

- the range and size of interim shared health data projects that are undertaken, and reasons behind why particular systems are selected for development over others;
- how hospitals combine systems recommended by the National Programme with systems selected to meet local priorities or by developing already existing systems for sharing patient data;
- how informatics managers reconcile the demands of clinicians, general managers and others in reaching investment decisions about the development of shared health data.
The nature of our work

We will use three main methods to collect data:

- In-depth face-to-face semi-structured interviews with IT professionals, managers, and clinicians.
- Observation of informatics and Project team meeting, presentations.
- Analysis of documents e.g. IT strategies, minutes of meetings.

We will not be talking to patients or viewing individual patient records.

What we are requesting from you?

Your hospital trust has kindly agreed to take part in this research study and you are one of twelve professionals and managers we wish to include in the interview stage of the project. We would be grateful if you were willing to be interviewed in depth about your work relating to IT implementation in your hospital. The interviews will last for up to an hour and take place at a time and work location convenient to you. With your permission, we would like to audio record the interview as it makes analysis more reliable.

It is up to you to decide whether to take part. If you agree to be interviewed you will be asked to sign a consent form, but you will be free to withdraw at any time without giving reason. We will always respect your choice, and anyone who does not wish to take part can ask the researcher not to record information.

What will happen to the information?

All the information collected during the course of the research will be kept confidential and personal details will be anonymised. The anonymised data will be stored on a secure University server, password and firewall protected and accessible only to the research team and at the end of the project will be securely archived for a maximum of seven years and then destroyed.

We will write a report based on the findings of the study and send it to the Trusts involved and to the SDO/Department of Health. We also aim to publish our findings in health informatics and health service journals. Trusts and individuals will not be named in any reports or publications.
Who has reviewed the study?

The design of the study has been reviewed by York NHS Research Ethics Committee.

Complaints

If you have a concern about any aspect of this study, please speak to the researcher (see numbers below) who will do their best to answer your questions. If you remain unhappy and you wish to complain formally, you can do this by contacting Leeds University sponsor representative, Clare Skinner, Head of Research and Support, Faculty of Medicine and Health at governance-ethics@leeds.ac.uk or telephone 0113 343 4897.

Thank you for taking time to read this leaflet. If you have any further questions about the study please contact the research team:

Professor Justin Keen → j.keen@leeds.ac.uk → 0113 343 6941
Dr. Paul G Dempster → p.dempster@leeds.ac.uk → 0113 343 0858
Jeanette Moore → j.moore@leeds.ac.uk → 0113 343 6993
Rose Peacock → r.peacock@leeds.ac.uk → 0113 343 2442

Institute of Health Sciences
Charles Thackrah Building
101 Clarendon Road
LEEDS
LS2 9LJ
Appendix 4 – Topic Guide

Below is the Topic Guide that was used in the early months of the field research. Minor additions were made to the guide in the course of the year in the field, to cover specific questions that arose from early interviews, observations at meetings or from site documentation.

**ELECTRONIC SERVICES: IMPLEMENTATION AND IMPACT**

**Study A: Interim IT systems in the NHS**

<table>
<thead>
<tr>
<th>Topic Guide (v14.10.09)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date &amp; time of interview</td>
</tr>
<tr>
<td>Interview code no.</td>
</tr>
<tr>
<td>Name of Trust</td>
</tr>
<tr>
<td>Name &amp; title of interviewee</td>
</tr>
<tr>
<td>Length of time in post</td>
</tr>
<tr>
<td>Role in IT implementation</td>
</tr>
<tr>
<td>Length of interview</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sheet given</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anonymity explained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal permission to taped received</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consent form given</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consent form received</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thank you letter sent</td>
<td></td>
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</tbody>
</table>

**Introduction**

Thank you for agreeing to take part in this research study.

The study has been funded by the National Institute for Health Research Service Delivery and Organisation R&D programme. The aim is to improve our understanding of interim IT investment decisions within the NHS by
studying the dynamics of design and implementation of systems intended to facilitate electronic sharing of patient data.

The focus of this interview is to capture managers’ experiences of deciding which local interim IT solutions to invest in and implement. The interview will last no more than one hour and, with your permission, will be audio-recorded as this will substantially improve the accuracy of analysis. All information will be anonymised. Neither the Trust nor individual staff will be identified when the research is written up and staff names and positions will be anonymised.

Before we begin, do you have any questions?

**We are primarily interested in the way in which the Trust decides to facilitate the development of sharing of patient data and uses interim IT systems in this process.**

<table>
<thead>
<tr>
<th>Key issue for discussion</th>
<th>Suggested question for discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Job role and responsibility</strong></td>
<td><strong>Can you tell me about your role in relation to IT planning or development?</strong></td>
</tr>
<tr>
<td>Introductory question about role in planning or developing IT systems.</td>
<td></td>
</tr>
<tr>
<td><strong>Interim IT solutions</strong></td>
<td><strong>Can you give me an overview of the types of IT systems being planned or developed in the Trust?</strong></td>
</tr>
</tbody>
</table>
| Questions about what types of IT systems are being developed in the Trust, and to identify specific examples of systems. | *Prompt:*  
What clinical areas are they being developed in?  
*Are any of these systems interim in their nature?*  
*Prompt:*  
Why is this?  
What makes them ‘interim’? |
| **Interim systems in care of older people and/or discharge planning** | **Tell me about any systems you are developing in care of older people and/or discharge planning?** |
| Questions which focus on systems in either or | *Prompt:*  
Why were these selected? |
| both these areas (depending on developments within the Trust) and to explore why these systems were selected. | What stage of development are they at?
Are they likely to be implemented Trust wide?

**What sharing of patient data do they facilitate?**

**Prompt:**
Will they link up to other systems in or outside of the hospital?
Are they hospital wide or within particular specialties only? |
### Issues raised in planning and developing interim IT solutions

Questions to identify technical, clinical or management issues which arose in the planning/development of these systems.

**Can you tell me about some of the issues (technical, clinical or management) that have arisen in the planning and development of these systems?**

**Prompt:**

- What technical issues e.g. data quality; real-time admission/discharge/transfer information come up?
- What issues come about in supporting clinicians in tailoring systems or learning new generic systems?
- What management processes have been necessary to support these developments?

### Side effects

Questions to identify anticipated or unanticipated side effects from planning/development of interim IT systems.

**Were there any side effects, anticipated or unanticipated, which have arisen from developing these systems?**

**Prompt:**

- Communications?
- Clinical?
- Technical?
- Management?

### Management strategy

Question about Trust’s strategic approach to IT development and the place of interim systems within this.

**Can you tell me about the Trust’s IT strategy that underpins or guides these developments?**

**Prompt:**

- Overview of key elements?

### Local health and social care economy

Questions about effects of local health and social care economy on Trust’s strategy, plan or developments.

**How have developments in the local health and social care economy affected the IT developments at the Trust?**

**Prompt:**

- Immediate area – PCT/acute Trust relations?
- Plans of neighbouring authorities?
<table>
<thead>
<tr>
<th>National Programme for IT</th>
<th>How do developments in the National Programme support the Trust’s development of interim systems?</th>
</tr>
</thead>
</table>
| Questions are about the role played by the National Programme in planning interim systems. | Prompt:  
How well do local/interim systems combine with systems recommended by the National Programme?  
Does the National Programme hinder in any way the Trust’s development of IT systems? |

<table>
<thead>
<tr>
<th>Ultimate vision</th>
<th>What is your ultimate vision for IT within the Trust?</th>
</tr>
</thead>
</table>
| Question is to ask about ultimate vision for IT within the Trust. | Prompt:  
How do you see IT developing over the next few years? |
Appendix 5 – Ethics Committee Approval

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available in the Integrated Research Application System or at http://www.rdforum.nhs.uk. Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.

Sponsors are not required to notify the Committee of approvals from host organisations.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

<table>
<thead>
<tr>
<th>Document</th>
<th>Version</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>REC application</td>
<td>21866/68321/07/752</td>
<td>19 October 2009</td>
</tr>
<tr>
<td>Protocol</td>
<td>October</td>
<td>2009</td>
</tr>
<tr>
<td>Investigator CV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant Consent Form</td>
<td>16 October 2009</td>
<td></td>
</tr>
<tr>
<td>Evidence of insurance or indemnity</td>
<td>08 October 2009</td>
<td></td>
</tr>
<tr>
<td>Referees or other scientific critique report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview Schedules/Topic Guides</td>
<td>V14.10.09</td>
<td></td>
</tr>
<tr>
<td>Covering Letter</td>
<td>20 November 2009</td>
<td></td>
</tr>
<tr>
<td>Participant Information Sheet</td>
<td>2</td>
<td>18 November 2009</td>
</tr>
<tr>
<td>Letter of invitation to participant</td>
<td>2</td>
<td>18 November 2009</td>
</tr>
<tr>
<td>Response to Request for Further Information</td>
<td>2</td>
<td>20 November 2009</td>
</tr>
</tbody>
</table>

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document “After ethical review – guidance for researchers” gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.
We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

09/H1311/87 Please quote this number on all correspondence

Yours sincerely

Mrs Alison Booth
Chair

Email: Joanne.Holmes@York.NHS.UK

Enclosures:  “After ethical review – guidance for researchers”

Copy to:  Ms Rachel De Souza, The Faculty Research Office, Level 10, Room 10.110, Worsley Building, Clarendon Way, Leeds, LS2 9JT
Appendix 6 – Topic Guide

Topic Guide - Project Manager interview, November 2010

The purpose of the study is to look at the process of implementation of electronic health systems in three acute trusts. We are interested in the context of the implementation within the organisation and also wider influences. We are interested in how the organisation and the informatics staff deal with the medium-term or interim nature of IT developments. In this Trust, we have focussed on [specific system].

How did you come to be involved in emed?

Can you draw me a picture of the structure of the emed project (and how it relates to other meetings and external structures)?

How do you see the role of project manager for emed?

The project manager has to be able to turn their hand to matters other than just the product that are connected to the organisation.

What do you think has gone well with the project?

What are your links with external people/organisations involved - the UCLH Trust?

Can you tell me about how the partnership with a commercial company has developed?

Direct access to developer?

How effective is the board in governance and direction of the project?

In your role as project manager, how do you encourage or ensure that decisions made about the product by the implementation team are sound/legitimate?

What have been the main project challenges so far and how have these been dealt with? - Clarity/whether technical and/or organisational.
Business redesign issues

PAS numbering

UAT strategy changes

TIE portal issues

It seems to be intensely pressured at times, what do you see as the main staff resource issues?

How do you implement a product in such a fluid organisational environment and the effect this has on project managers role?

(At one point you talked about the "Not knowingness" aspect of the project was difficult. What is the issue here?)

Ultimately what are you aiming for overall - how much of an organisational and business change do you think this will bring?

I hope you won't mind me getting back to you if I have any queries and if we get a time extension later on in your process.
Addendum:

This document is an output from a research project that was commissioned by the Service Delivery and Organisation (SDO) programme whilst it was managed by the National Coordinating Centre for the Service Delivery and Organisation (NCCSDO) at the London School of Hygiene & Tropical Medicine. The NIHR SDO programme is now managed by the National Institute for Health Research Evaluations, Trials and Studies Coordinating Centre (NETSCC) based at the University of Southampton.

Although NETSCC, SDO has managed the project and conducted the editorial review of this document, we had no involvement in the commissioning, and therefore may not be able to comment on the background of this document. Should you have any queries please contact sdo@southampton.ac.uk.