Routes to EPR: trust strategies for electronic patient records and progress towards paperless working

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Introduction

Electronic patient records are the biggest single segment of the NHS IT market and the biggest investment in software that an NHS trust is likely to make.

Their importance has been stressed in successive NHS IT strategies, which have drawn attention to the clinical and administrative benefits of having records readily available to staff at the point of care, on which other information uses can be built.

Despite this, only partial coverage has been achieved to date. The 2000 IT strategy introduced the National Programme for IT in the NHS to digitise the health service in England and, in the process, to deploy EPR systems to 122 trusts.

The programme, which began in 2002, failed to deliver a working system to the vast majority of acute trusts and was shut down in 2012. Trusts are now responsible for buying and funding their own systems.

At the start of 2013, health secretary Jeremy Hunt announced his vision for a paperless NHS by 2018 – to be achieved through the implementation of EPR systems and electronic communications. NHS England is set to publish guidance in June on how trusts should approach this task, and trusts are expected to have plans in place by April 2014.

Trusts are at hugely varied stages of EPR development and are currently dealing with the latest round of NHS reorganisation and the second year of the ‘Nicholson challenge’ to find £20 billion of efficiency savings by 2015.

Against this background, EHI Intelligence interviewed IT directors and other senior staff with responsibility for IT at 10% of the 160 acute trusts in England, to build a detailed picture of options that are available to trusts to move forward.

The interviews yielded detailed profiles of the individual trusts’ EPR strategies and progress to date. The profiles, which make up the latter part of this report, also detail how they have budgeted for IT development, the challenges that they expect to face, and the benefits they foresee from improving their EPR functionality.

They also provide insight into whether trusts believe the paperless target set by Hunt is realistic. Most don’t. While a very small number of interviewees that felt their trust will become paperless, most were looking instead to become ‘paper-lite’ or “as paperless as possible.”

Hunt has argued that greater investment in IT will lead to financial savings, but this is not an imperative for most interviewees. Instead, procuring and developing systems that will enable their clinical colleagues to provide better care for patients is the driving factor.
The deployment of electronic patient record systems into NHS trusts, and integrated care records into healthcare communities, has been a long-standing ambition of policy makers.

The NHS saw its first IT strategy published in 1992, and three similar strategies have been published since. What has changed is the way the strategies have approached the task of getting EPRs in place. The 1992 strategy introduced a six-stage EPR model, which started with a basic patient administration system and built to more sophisticated levels of clinical functionality.

In 1998, the ‘Information for Health’ strategy aimed to increase the level of EPR functionality within the NHS. However, it left trusts to procure their own systems to meet the targets and by the start of 2002 it was obvious that these were going to be missed.

Consequently, the publication of ‘Delivering 21st century IT support for the NHS: national strategic programme’ led to the development of the National Programme for IT in the NHS.

This aimed to digitise the health service through a centrally funded programme that would create a national broadband infrastructure, deliver a set of national projects including electronic booking, and create an NHS Care Records Service; essentially a national EPR system, but requiring major work in every NHS organisation.

In order to deliver the Care Records Service, the country was split into five ‘clusters’, with local service providers appointed for each. The LSPs placed contracts with suppliers for ‘strategic’ systems that they were supposed to deploy at trusts and other NHS organisations.

After many changes, two firms survived as LSPs: BT, using Cerner’s Millennium, was meant to establish EPRs for trusts in London (where it had some success) and the South of England (where progress was more limited); while CSC, using iSoft’s Lorenzo, was meant to establish EPR in trusts in the North, Midlands and East of England (where progress was very limited indeed).

In May 2011, the National Audit Office concluded that of the 122 systems that the LSPs were contracted to deliver to acute trusts in England, more than 80% had not been deployed – although a number of trusts, particularly in the NME, received ‘interim’ systems that may now become the basis of their EPR plans.

The programme was finally scrapped in 2012. However, nine trusts in the NME region have taken advantage of an interim agreement between NHS England and CSC to deploy Lorenzo with some central funding. Separately, a handful of trusts using ‘interim’ or legacy systems have independently bought System C’s Medway EPR or other systems, while trusts in the South of England that received nothing from the programme are still pursuing new, joint procurements with some central funding.

At the start of 2013, health secretary Jeremy Hunt announced a vision for a paperless NHS by 2018, achieved through the implementation of electronic records and electronic communications.

Trusts are now waiting for guidance from NHS England on how they should draw up plans to use electronic records. This guidance is due in June, and trusts are supposed to have plans in place by April 2014 that can be implemented over the following year.

At the moment, there appears to be no central funding for this initiative, although in May 2013 Hunt announced a £260m ‘Digital Challenge’ fund, primarily to support electronic prescribing in hospitals.

This history of successive attempts to digitise the NHS has left individual trusts at different stages of EPR implementation. To ascertain the current position, EHI Intelligence set out to gain a more detailed understanding of the routes to EPR available to them, and the progress made to date.

This has been achieved by carrying out in-depth interviews with IT directors at 10% of the 160 acute trusts in England, asking them to discuss their current EPR status and future plans, the challenges that they face and their overall expectations of EPR systems in terms of costs and clinical and productivity benefits.
Methodology

EHI Intelligence interrogated the EHI Intelligence NHS Trust Database, which contains details of all the core systems in use in acute and mental health organisations, to identify trusts that appeared to be pursuing different EPR strategies.

Analysts then invited the IT directors of a range of trusts to take part in this research, making sure to include trusts of different sizes, situated in different parts of the country.

The aim was not for a balanced sample on all of these criteria: several trusts were selected on the basis of interesting recent work or procurement. As a result (because they tend to lead rather than follow technology trends) the selection picked up more larger trusts than medium or small ones.

Interviews were conducted at 16 trusts – 10% of England’s 160 acute trusts. EHI Intelligence analysts met or spoke to a person directly involved in the implementation of electronic patient records at all but one of these, using a structured interview. One trust, North Bristol, answered the same set of questions in writing.

In addition to covering the structured interview questions, analysts asked interviewees to elaborate on some points, and entered into further discussions, to gain a strong understanding of each trust’s work and plans. The research was carried out in March, April and May 2013.

EHI Intelligence would like to thank the interviewees for their generosity with their time.

Trusts included in the research

An interactive version of this map is available at www.ehi.co.uk/SJH62
What is EPR?

One legacy of the NHS’ many IT strategies is that a number of terms are in use for electronic records. Information for Health introduced the idea of an electronic patient record as an organisational record, and an electronic health record as a cross-organisation (or ‘cradle to grave’ record), for example.

There is also considerable debate about whether it makes sense to talk about ‘an’ EPR (as a ‘thing’ or ‘system’) or whether it should, instead, be seen as a ‘state’.

For this report, EHI Intelligence’s analysts asked interviewees to provide their own definition of EPR, and the general consensus was effectively summed up by William Smart, director of information systems and technology at the Royal Free London NHS Foundation Trust.

He said: “An EPR is an aggregation of all the electronic sources of information we have about a patient.” He was one of several interviewees who said this should include information from across health and social care, rather than just from one, individual trust.

EHI defines EPR as the core, organisational record on which other initiatives – including secondary uses – can be built. This is equivalent to the first definition above, while recognising the second.

A few interviewees went further to say that an EPR needs to enable more ‘active’ use of the information within the EPR, rather than simply moving records from paper to digital.

This was summarised by Colin Sweeney, director of IM&T at King’s College Hospital NHS Foundation Trust, who said that scanning paper records “is really good for a point of making things available to people, but you’re not actually getting information out of that to help with decision support or the active way that people work.”

Similarly, Mike Brooks, interim head of IM&T for North Bristol NHS Trust, said in his written response that a “good” EPR makes data on paper “available in real time to anyone at any time”, a “better” one would add real time specialist information, images and ultrasound, while “the best” would also include intelligence including decision support and automatic alerts.
EPR status

On their own assessment, all of the trusts involved in this research have an EPR system live already; although 11 of the 16 interviewees qualified this by saying their system was “live in part” or similar.

The most pessimistic response came from Cambridge University Hospitals NHS Foundation Trust; eHospital programme director Carrie Armitage described its current set of systems as a "burning platform", with some EPR functionality in a few parts of the trust but “really poor” integration.

Cambridge University Hospitals plans to replace everything with a single system from Epic, ahead of a move into a new hospital.

Papworth Hospital NHS Foundation Trust may participate in the same eHospital project, although it had not decided whether or not to do so at the time of our research. Its participation or otherwise will set the future course for its work.

A trust that is definitely looking for a radical change of direction is University Hospitals of Leicester NHS Trust, which recently signed a digital hospital project deal with IBM, with which it will choose new software.

Some of the trusts that have partially live EPRs in place have the systems they want, but are still in the process of implementing them.

They include Brighton and Sussex University Hospitals NHS Trust, North Bristol NHS Trust and Northumbria Healthcare NHS Foundation Trust. These trusts have taken different procurement routes to their current position, with Brighton breaking out of NPfIT with Alert, and North Bristol implementing Cerner Millennium through the programme.

University Hospital Southampton NHS Foundation Trust has taken what IM&T director Adrian Byrne described as “a multi-vendor approach.” The trust has much of what it wants in place, but plans to add new suppliers for functions including intensive care and decision support.

Two trusts that are further along still face a contracting challenge, as the national programme’s contracts come to an end in 2015.

These are Kingston Hospital NHS Foundation Trust, which has implemented Cerner Millennium and has everything live except e-prescribing, which it will be adding from June 2013, and Royal Free London, which has Cerner functionality live in many areas, but is framing what it wants from a replacement deal.

A couple of trusts are in a similar state of development with existing software, but are doing so with their own systems.
Moorfields Eye Hospital NHS Foundation Trust has developed its own in-house EPR software OpenEyes, but is only part of the way through introducing it across the trust. This also applies to some extent to Leeds Teaching Hospitals NHS Trust, which makes significant use of in-house software.

Five trusts assessed themselves as having an EPR fully live. Andy Laverick, chief information officer of Heart of England NHS Foundation Trust, which has been developing its in-house EPR for a decade, described its status as “live but still evolving.”

The interviewees from Hinchingbrooke Health Care NHS Trust, King’s College Hospital, Royal Liverpool and Broadgreen University Hospitals NHS Trust and University Hospitals Birmingham NHS Foundation Trust similarly said that their trusts have a live EPR – but all have further development plans.

New builds and EPR projects

Several of the IT programmes outlined in this research have been aligned with trust moves to new buildings. It would be unusual for a trust with a substantial building project not to consider a linked IT programme, particularly one to reduce paper usage, which can generate major efficiencies.

It would normally expect this to go live a year or two before the physical move, to enable clinical staff to get used to new systems, and to enable IT staff to concentrate on hardware and communications during the move itself.

University Hospitals Birmingham implemented new EPR systems in 2010-11, before many of its departments moved to the new Queen Elizabeth Hospital in 2011-12. North Bristol went live with Cerner Millennium in late 2011, two years before it is due to move all of its functions to the new Southmead Hospital.

Royal Liverpool and Broadgreen, which has a programme to greatly reduce its use of paper (rather than to introduce EPR systems specifically) will move to a major new campus in 2017. Papworth Hospital, if it moves to a new hospital in Cambridge in 2018 and joins the eHospital project, will implement the software well in advance of the physical move.

Procurement cycle

Half of the trusts in this research were developing their EPR systems in an incremental fashion. The other eight were at an identifiable position in an IT strategy focused on, or including, EPR.

The trust at the earliest point in the procurement cycle – although arguably also the latest, since it has had an EPR system for five years – is Royal Free London, which expects to sign a new deal for EPR software in spring 2014, ahead of its NPfIT-related deal with Cerner running out.

Further along are trusts about to take a decision over a new supplier (Papworth Hospital and University Hospitals Leicester) and one trust that has just done so (Cambridge University Hospitals).

Further on again are trusts such as Brighton and Sussex University Hospitals, which is one year into a three year implementation project, and North Bristol, which is two years into a ten year contract.
The self-development route – which tends not to be a cycle, as there is no core contract to be renewed – has been taken by Moorfields Eye Hospital and University Hospitals Birmingham, which are three and four years respectively into developing their own EPR systems.

King’s College Hospital and University Hospital Southampton can also be seen as being, in both cases, 15 years into their EPR implementation projects.

**In-house development**

With the important exceptions of University Hospitals of Leicester, which will transfer all of its staff to its IT partner IBM, and Cambridge University Hospitals, which will transfer about half of its IT staff to HP as part of the eHospital project, the trusts in the research displayed little interest in outsourcing.

Indeed, seven of the trusts in the research undertake significant in-house development. In the case of Moorfields Eye Hospital and Leeds Teaching Hospitals, the trusts are their own key suppliers.

Bill Aylward, Moorfields Eye Hospital’s former medical director and the EPR project’s development leader, said that commercial suppliers would quote tens of thousands of pounds and months waiting for minor changes. “That is not acceptable. We needed something that is very agile and flexible, and by those criteria alone, pretty much everything in the market failed.”

Both trusts make the resulting software available on an open source basis. King’s College Hospital, which also undertakes significant levels of in-house development, makes its Wardware nursing observation system (developed in association with Airslie and Tactix4) available on the same basis.

Eileen Jessop, deputy director of informatics for Leeds Teaching Hospitals said that, if adopted more widely, its provision of an open source cancer patient pathway management system would save on retraining staff when they moved between trusts.

However, some trusts commercialise their in-house developments. University Hospitals Birmingham has sold both software and outpatient check-in kiosks to other trusts, with support from commercial partners. While this is unusual for IT products, it is not uncommon for NHS trusts to supply their peers with shared back-office services including informatics.

Those trusts making substantial use of in-house development, which tend to be larger or specialist, praised the control this gives them. However, none uses their own software exclusively, giving them the choice of commercial products if these represent a better choice.
Routes to EPR

EHI Intelligence’s analysts asked interviewees for a very brief summary of their strategy to attain electronic patient records, or their route to EPR.

Analysts offered three suggestions, used in previous EHI Intelligence reports on EPR: ‘single supplier’, in which a trust uses systems from one vendor for all its EPR functionality; ‘PAS plus’, in which a trust uses one vendor for its PAS and core departmental systems alongside other systems; and ‘best of breed’, in which many systems are connected, often via a portal.

However, EHI Intelligence also accepted alternatives, based on trusts’ descriptions of their system architecture.

Only one trust, Papworth Hospital, felt ‘PAS plus departmental systems’ summed up its approach. Several other trusts had similar hub and spoke models, but used software other than their PAS as the hub. For example, Heart of England has decided against replacing its PAS and is instead using several modules of software in its place.

As a result, this report uses ‘core plus departmental systems’ for this model.

<table>
<thead>
<tr>
<th>Trust</th>
<th>Route to EPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moorfields Eye Hospital NHS Foundation Trust</td>
<td>Building its own open source single system, OpenEyes</td>
</tr>
<tr>
<td>Cambridge University Hospitals NHS Foundation Trust</td>
<td>Single supplier</td>
</tr>
<tr>
<td>University Hospitals of Leicester NHS Trust</td>
<td>With service provider, aspiring to single software supplier but may use some other systems</td>
</tr>
<tr>
<td>Papworth Hospital NHS Foundation Trust</td>
<td>PAS plus departmental systems (currently), single supplier (under eHospital)</td>
</tr>
<tr>
<td>Brighton and Sussex University Hospitals NHS Trust</td>
<td>Core EPR plus a reduced number of department systems</td>
</tr>
<tr>
<td>Royal Free London NHS Foundation Trust</td>
<td>Core EPR plus departmental systems</td>
</tr>
<tr>
<td>Kingston Hospital NHS Foundation Trust</td>
<td>Core integrated system complemented by best of breed including a portal</td>
</tr>
<tr>
<td>University Hospitals Birmingham NHS Foundation Trust</td>
<td>Clinical portal, drugs prescribing and observation system and departmental systems</td>
</tr>
<tr>
<td>Heart of England NHS Foundation Trust</td>
<td>Best of breed with portal</td>
</tr>
<tr>
<td>Hinchingbrooke Health Care NHS Trust</td>
<td>Best of breed with clinical viewer</td>
</tr>
<tr>
<td>King’s College Hospital NHS Foundation Trust</td>
<td>Best of breed with active portal</td>
</tr>
<tr>
<td>Leeds Teaching Hospitals NHS Trust</td>
<td>Best of breed with portal</td>
</tr>
<tr>
<td>North Bristol NHS Trust</td>
<td>Best of breed with in-house portal</td>
</tr>
<tr>
<td>Northumbria Healthcare NHS Foundation Trust</td>
<td>Best of breed with portal</td>
</tr>
<tr>
<td>Royal Liverpool and Broadgreen University Hospitals NHS Trust</td>
<td>Best of breed with portal</td>
</tr>
<tr>
<td>University Hospital Southampton NHS Foundation Trust</td>
<td>Multi-vendor approach with portal functionality</td>
</tr>
</tbody>
</table>
Single supplier

The most striking aspect of this part of EHI Intelligence’s research is the unpopularity of the single supplier model. Only two of the trusts in the interview sample have definitely chosen this as their route to EPR – and one, Moorfields Eye Hospital, is building the software itself.

Cambridge University Hospitals, as discussed earlier, has chosen Epic. Two further trusts were considering the single supplier model, but had yet to decide in its favour. University Hospitals of Leicester said it aspired to a single supplier, but may continue to use other systems as well.

“That’s our aspiration, because best of breed doesn’t work,” said its chief information officer, John Clarke. “But we will end up, probably, with some compromising around the edges. In a large university teaching hospital, you sometimes end up needing something so specialist that no large vendor can give it to you.”

University Hospitals of Leicester is also unusual in having chosen a different kind of single supplier – IBM – as its prime contractor for IT, an approach which appears to be almost unique in the NHS.

If Papworth decides to join the eHospital project, the importance of its specialist departmental systems could also see it deciding to retain some of them.

“There are no national applications for some of those diseases,” said head of IT and systems Michael Moore.

Core plus departmentals

Four trusts in the research sample identified their route to EPR as a strong central system supplemented with departmental software, including University Hospitals Birmingham, whose central software is written in-house.

Interestingly, three of these trusts are using software that is usually marketed as a single supplier option (Royal Free London and Kingston Hospital, which use Cerner Millennium, and Brighton and Sussex University Hospitals, which is using Alert).

Their interviewees said the software is being used as their core, rather than their only, system. “The patient record is scattered a bit,” said Brighton and Sussex EPR programme manager Judith Steen; the EPR work “will be the glue that joins these things together.”

Best of breed

Eight of the 16 trusts interviewed employ a variant of the ‘best of breed with portal’ model, using a layer of software to join up other systems. Those being joined up in this fashion are usually departmental systems, but in the case of North Bristol they include Cerner Millennium.
Integration and interfacing

These routes to EPR can also be seen in terms of where trusts put the boundary between integrated systems and software that has to be interfaced to them.

Interviewees in trusts interested in the single supplier route talked about integrated systems reducing the burden on IT departments and enabling the effective use of care pathways and decision support.

However, trusts can make other shifts along the boundary over time. A couple of trusts were considering increased software integration, and others spoke of the need to reduce the number of systems they were running.

Stephen Chilton, director of IT services for University Hospitals Birmingham, said the trust had 100 departmental systems, although this had already been halved following a review, and the trust aims to reduce it further to 60. Even so, this is a high number. Royal Liverpool and Broadgreen has 22 departmental systems, and Brighton and Sussex 15.

However many reductions they make, however, large and specialist trusts see a need to interface to very specialist systems at some point— as Clarke noted (above).

The interviewees that defended ‘best of breed’ saw it as an economical choice, saving both money and the disruption inevitable when new systems are installed and staff have to be trained on them.

They also argued that this approach reduces reliance on a single supplier; and enables clinicians to choose the software that works for their departments. “It’s good to maintain some competition and to keep an open mind,” said Kingston Hospital’s director of IM&T Anthony Brewer. “It means that we can decide on any new system on its merits.”
All but two of the interviewees for this research provided a rating for their existing suppliers out of five, with one meaning very dissatisfied, three neutral, and five very satisfied.

The answers were in a tight range: all but two were three or four (or between these two figures when answers from interviewees who provided more than one rating were averaged). The mean was 3.66, suggesting that trusts are neither unhappy nor particularly happy with their main suppliers.

Only one trust, Royal Free London, rated its current suppliers below neutral (“two to three”), and it is in the process of repurchasing its core software (Cerner’s Millennium, which is currently delivered through a contract negotiated by NPfIT).

At the other extreme, only one trust, Moorfields Eye Hospital awarded a perfect five to its supplier; it supplies itself.
EPR budgets

EHI Intelligence asked each trust for an EPR project budget if available, and six trusts provided this. These are difficult to compare because of the differing scale of both trusts and the projects. However, they make it clear that an EPR project is a significant undertaking for a trust – something which is also clear from the fact that projects typically last for a decade.

Budgets vary greatly in size, both in cash terms and as a proportion of a trust’s IT budget. In simple terms, they range from £4.5m for Moorfields Eye Hospital’s in-house development of OpenEyes to £200m for Cambridge’s eHospital programme.

The average total for an EPR project in the trusts involved in this research is £62m and the average annual budget (including Southampton’s annual spending on new systems) is £5.4m.

Meanwhile, Cambridge University Hospital’s annualised eHospital budget is more than four times its 2010-11 IT budget, although the project is specifically aiming to address underspending on technology by the trust.

Papworth Hospital, if it joins eHospital, is set to double its IT spending. Excluding Moorfields Eye Hospital, the remaining four trusts with identifiable project budgets spend, or will spend, on average around a third of their IT budgets on implementing or improving EPR.

In general, more integrated projects appear to be proportionately more expensive – with the exception of the OpenEyes project at Moorfields, which takes up just an eighth of its IT budget. North Bristol’s spending appears to be relatively high, but it is using Cerner Millennium, designed to be a single integrated system, for a best of breed approach.

### Budget plans

<table>
<thead>
<tr>
<th>Trust</th>
<th>EPR budget (£m)</th>
<th>Years</th>
<th>Budget/yr (£m)</th>
<th>% of IT budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brighton and Sussex University Hospitals NHS Trust</td>
<td>34</td>
<td>10</td>
<td>3.4</td>
<td>30%</td>
</tr>
<tr>
<td>Cambridge University Hospitals NHS Foundation Trust</td>
<td>200</td>
<td>10</td>
<td>20</td>
<td>408%</td>
</tr>
<tr>
<td>Moorfields Eye Hospital NHS Foundation Trust</td>
<td>4.5</td>
<td>five</td>
<td>0.9</td>
<td>12%</td>
</tr>
<tr>
<td>North Bristol NHS Trust</td>
<td>35</td>
<td>10</td>
<td>3.5</td>
<td>53%</td>
</tr>
<tr>
<td>Papworth Hospital NHS Foundation Trust</td>
<td>40</td>
<td>10</td>
<td>4</td>
<td>205%</td>
</tr>
<tr>
<td>University Hospital Southampton NHS Foundation Trust</td>
<td>n/a</td>
<td>n/a</td>
<td>1.9</td>
<td>25%</td>
</tr>
<tr>
<td>University Hospitals of Leicester NHS Trust</td>
<td>60</td>
<td>15</td>
<td>4</td>
<td>36%</td>
</tr>
</tbody>
</table>

| Average                                        | 62.25           |       | 5.39           |                |


EPR may be software, but its successful implementation depends on hardware. This is particularly true when trusts are looking to remove paper from processes, and for the more advanced projects that include decision support, since these require devices to be available at the bedside or ‘point of care’.

Eileen Jessop, deputy director of informatics of Leeds Teaching Hospitals, cited a lack of reliable hardware and communications infrastructure as a blocker in introducing electronic prescribing. “We can’t do e-prescribing until we’ve got that in place, because you can’t have things failing,” she said of its plan to improve its data centres, storage and disaster recovery.

The requirement to have systems in use at the bedside can be met by bedside terminals, computers on wheels (‘cows’), mobile devices – belonging to the trust or to its employees if it has a ‘bring your own device’ policy – or a combination. For mobile devices, excellent wireless connectivity is required.

Over a long period, the improved hardware and communications needed for an advanced EPR project can be much more expensive than the software. For example, for its eHospital programme, Cambridge University Hospitals will spend £140m with its hardware and communications provider HP, but just £40m with its EPR software supplier Epic. In both cases, the figures will cover a decade. And eHospital programme director Carrie Armitage said they will take the trust from a position which IT was “hopelessly underfunded” to one in which it will be “flooding the place” with 6,000 devices for 7,500 staff. Eventually, the trust will have 1,000 touchscreens; one by every bed.

Leicester is expecting to buy both hardware and software through IBM for its digital hospital programme. And those trusts with major building projects tend to plan in their IT and communications infrastructures from the outset.

New builds can overcome the problems that often block wireless signals in older hospitals, and a physical move is an obvious time to buy new computer hardware, as it avoids the cost of moving existing hardware.

The hardware requirements for EPR tend to be less visible when a trust is staying put and using numerous suppliers. BYOD adds a further complication.

Adrian Byrne, IM&T director of University Hospital Southampton, pointed out that it does not make hardware ‘free’, since devices have to be managed and: “We will still need to put licences on those things, and that’s incredibly expensive.”
EPR plans

As noted earlier, all the trusts involved in the research for this report believed that they already have an EPR system live in full or part.

Despite this, four were in the process of buying or building a new EPR system: Brighton and Sussex, Cambridge University Hospitals, University Hospitals of Leicester and Papworth Hospital, assuming its participation in Cambridge’s eHospital project.

In all of these cases, the trusts are looking to implement new, single-supplier systems that will be significantly more integrated than the systems they have in place already, put them on a better platform for further expansion and, in the case of Cambridge and Leicester in particular, significantly improve the communications and hardware available to staff.

A further five were upgrading their existing EPRs: Kingston Hospital, Moorfields Eye Hospital, Royal Free London, University Hospital Southampton, and University Hospitals Birmingham.

Kingston Hospital plans to add e-prescribing and clinical documents to its implementation of Cerner’s Millennium, while Royal Free London, currently using the same software, will start procurement of a new contract for EPR provision, which will either replace or renew Millennium.

Moorfields Eye Hospital plans to extend use of its open source OpenEyes system across the trust by the end of the year, while University Hospitals Birmingham will continue to add to its largely in-house systems - as it often commercialises these, it was unwilling to discuss detailed plans.

University Hospital Southampton plans to add electronic document management, decision support and bed management systems.

The other trusts involved in the research were planning to maintain their existing systems, and to make incremental improvements. As at Southampton, they displayed a particular interest in projects to remove paper and add elements of clinical decision support. There is also interest in sharing information with wider healthcare economies.

Hot technologies

Eight of the 16 trusts involved in the research reported work on scanning patient records / electronic document record management projects, in some cases as parts of larger EPR projects.

These were Cambridge University Hospitals, Heart of England, Hinchingbrooke Health Care, Kingston Hospital, Leeds Teaching Hospitals, North Bristol, University Hospital Southampton and University Hospitals of Leicester.

Scanning / EDRM projects are one way to deal with ‘legacy paper’ – or records that have not been included within an EPR. Trusts may also like them because they can make cashable (as opposed to staff efficiency) savings on them within short periods, such as two years.

These savings can come about in two ways. Firstly, EDRM projects may enable trusts to reduce the number of staff employed to handle physical paper files. Hinchingbrooke Health Care, which operates one relatively small hospital, believes it can cut about ten staff by moving fully to electronic records.

Gordon Greaves, associate director of IM&T for Hinchingbrooke said that the trust currently has 14 staff handling paper records, but this number can be reduced to four when it moves fully to electronic records.
Secondly, EDRM may cut storage costs, particularly if paper notes are stored in a separate building that can be closed – the plan at University Hospital Southampton. As previously noted, trusts moving to new hospitals may not plan to create paper storage rooms.

Four trusts were also giving priority to the creation of electronic forms: Heart of England, King’s College Hospital, Moorfields Eye Hospital and Royal Liverpool and Broadgreen. Electronic forms remove another use of paper and can deliver benefits to hospitals by enabling them to better monitor activity.

The same number of trusts were prioritising e-prescribing: Kingston Hospital, Leeds Teaching Hospitals, Moorfields Eye Hospital, North Bristol and Northumbria Healthcare. As mentioned earlier, e-prescribing is now receiving central government support through a £260m fund.

Five interviewees talked about specific work on decision support: Cambridge University Hospitals, King’s College Hospital, University Hospital Southampton and again Moorfields and Royal Liverpool.

Both these types of system make it easier to spot dangerous problems and to enforce efficient treatment protocols. Tony Shannon, the chief clinical information officer of Leeds Teaching Hospitals, has called this “sun-shining the data”.

However, these kinds of systems come towards the ‘top’ of the EPR models developed in the 1990s. It is not usually feasible for trusts to implement them until they have good supporting systems in place, including good infrastructure (see hardware section above).

As a result, while there is a finite capacity for new projects to reduce NHS paper, there is likely to be a demand for such systems for a long time to come.

Challenges

EHI Intelligence’s analysts asked all of the interviewees who took part in this research what they expected their greatest challenge to be in advancing their trust’s EPR plans.

Of the 12 who provided an answer, seven mentioned changes to staff working practices, also known as ‘cultural’ issues. Three trusts mentioned lack of resources, while two mentioned the management of demand and expectations.

James Norman, director of IM&T for Royal Liverpool and Broadgreen University Hospitals, saw working practice changes, keeping staff engaged and managing expectations as his greatest challenges, effectively summed up for most of his colleagues: “The technology is the easiest bit.”

Leeds Teaching Hospitals and University Hospital Southampton disagreed with the others, citing technological issues as challenges: “I think that culture hits you when you deliver a load of rubbish,” said Adrian Byrne, Southampton’s IM&T director.
The NHS Number

The NHS Number is a unique ten digit number for every patient in England and Wales, adapted from the serial numbers of Second World War national identity cards.

Successive NHS IT strategies have called for it to be used on all patient records, and the National Patient Safety Agency mandated its use as the national patient identifier (or alongside any local identifier) in September 2008.

The present government has re-affirmed that mandate, urging all NHS organisations to use the NHS Number as the primary identifier on all patient records. EHI Intelligence asked interviewees whether the NHS Number was being used in this way in their trust and, if not, whether it would be used this way in the future.

The difficulties for trusts in following government policy are legion. Firstly, NHS trusts do not just treat patients with NHS Numbers. Hinchingbrooke sees many eastern Europeans who work locally, while Northumbria has many Scottish patients - who are foreigners as far as the NHS Number is concerned.

Trusts were not specifically asked for the proportion of patients without NHS Numbers, but among those that gave a figure it ranged from 0.3% to 20%.

Secondly, some trusts still make substantial use of records (including paper records) that are tied to their in-house numbering system, although this appears to be a declining problem, since most computerised records can use both trust and NHS numbering as available.

Thirdly, several trusts said that other organisations, such as referring GPs or partners in a local health and social care record, do not provide or use NHS Numbers.

Fourthly, some trusts said that it is not always possible to get an NHS Number for emergency admissions. Fifthly, there are specific issues with some sensitive services, such as the sexual health clinics that some acute trusts have taken over from community providers.

For example, University Hospitals Birmingham’s Whittall Street Clinic uses its own numbering system on its records and samples, to reassure patients that results of tests for infections, including HIV, are kept confidential.

Despite all of this, EHI Intelligence’s interviewees supported the use of the NHS Number as the primary identifier within the healthcare system. Most stressed that they are doing work to comply with the government’s policy, for example by making the NHS Number a joint primary identifier, or intending to make it their primary identifier in the future.

Three trusts said they are already using the NHS Number as their sole primary identifier: Leeds Teaching Hospitals, Papworth Hospital and University Hospitals Birmingham. However, Papworth and Birmingham both said they had alternatives.

Leeds said it is working on getting partners to use it as well, with Leeds City Council now having an NHS Number on 95% of its social care records. Cambridge University Hospitals said it will when its eHospital project is implemented in autumn 2014.
Shared patient records

Several trusts in the research for this report discussed their involvement in establishing shared records in their local areas.

The best developed project of this kind appears to be Connecting Care, now run by NHS South West Commissioning Support Unit, which has absorbed Avon IM&T, the previous project owner.

It will establish a common record across Bristol, North Somerset and South Gloucestershire for the area’s three acute trusts, which include North Bristol, three clinical commissioning groups, three community health providers, the three local authority social care departments, the local ambulance service and the local mental health trust.

The project started in early 2010 and in 2012 Orion Health and NextGate were selected to provide an integration engine and a master patient index respectively.

Similar projects are appearing elsewhere, generally covering a city or, in the case of London, a section of it. Leeds Teaching Hospitals is involved in developing the Leeds Care Record.

“I would expect my electronic patient record to have everything in there that is known about me from all the clinicians that have ever done anything to me. So whether that’s in social care, primary care, mental health or secondary care I would expect it in there,” said deputy director of informatics Eileen Jessop.

Elsewhere, Heart of England and University Hospitals Birmingham are among the partners developing a single care record for Birmingham and Sandwell.

Royal Free London is working with other trusts in the North and North East London NHS local area team zone, including other members of the UCL Partners academic health science partnership, to develop shared records. And King’s College Hospital is part of the South London integrated care programme.

As a step towards such local integrated records, several trusts already provide access to local GPs to their systems; Heart of England sends them blood results and A&E attendance electronically, and also provides log-ins to its EPR on request. However, it and others reported difficulties in getting reciprocal access to the data in GPs’ systems.
Paperless and paper-lite ambitions

Health secretary Jeremy Hunt’s target for the NHS to go paperless by 2018 would be a challenge for many organisations, but it is a particular challenge for the NHS, which is both a very heavy user of paper and required to keep records for many years.

The Department of Health compels trusts to retain maternity records for 25 years after the birth of a mother’s last child, and mental health treatment records for either 20 years after the last contact with a patient or eight years after the patients’ death if sooner.

Many acute trusts run libraries holding many millions of sheets of paper. University Hospitals of Leicester – which is planning an EDRM system as part of its relatively new prime contractor deal with IBM – estimates it has 160m.

Leicester employs almost exactly 1% of the English NHS workforce; if it is typical, the health service may hold records amounting to 16 billion pieces of paper.

Of the trusts involved in this research, only North Bristol has set a date for going paperless – 2017. Leeds Teaching Hospitals said it intended to remove all paper in time – it is already paperless in some departments – but did not set a date.

“I just don’t think the technology is there or easy enough to use yet in order to achieve a completely paperless environment,” said deputy director of informatics Eileen Jessop.

Revealingly, Cambridge’s eHospital programme, probably the most ambitious IT project in the NHS, includes a managed print strategy. However, it and many other trusts in this research are aiming to move to ‘paper-lite’ working.

As discussed above, two drivers for this are a move to new buildings – which are often built without libraries and paper stores - and the implementation of EDRM projects.

Scanning

Interviewees reported differing approaches over how to treat their legacy paper records. Scanning is a major cost, and this is deterring an increasing number of trusts from scanning wholesale at the outset of EDRM projects.

In addition, there are questions about the usefulness of scanned paper. King’s College Hospital IM&T director Colin Sweeney said his trust is focusing on digitising processes because “an illegible paper note remains illegible even after scanning.”

An increasing number of trusts are looking to ‘scan on demand’ – or scan when staff need the information in a particular record.

There are similar differences over the on-going use of paper. Some trusts, including King’s College Hospital and Moorfields Eye Hospital, want to remove paper as far as possible, but others defend its use in some circumstances.

Heart of England and Northumbria Healthcare intend to allow clinicians to continue to make notes when treating patients, as long as these are scanned afterwards.

University Hospitals Birmingham has removed paper from many processes, but has also pioneered the use of check-in kiosks, which rely on patients bringing a printed letter with a barcode on it with them at the very start of the treatment process.

Several trusts said that other organisations, as well as patients, will continue to send, and want to receive, paper communications.

Overall, interviewees said they are aiming to reduce their use of paper, but very few wanted to remove it completely. Stephen Chilton, director of IT services for University Hospitals Birmingham, summed up: “Where it is appropriate and safe to do so, yes. Where it’s not, no.”
## Plans on paper

<table>
<thead>
<tr>
<th>Trust</th>
<th>Aim</th>
<th>Specific plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brighton and Sussex University Hospitals NHS Trust</td>
<td>Paper-lite</td>
<td>Will scan some records on demand</td>
</tr>
<tr>
<td>Cambridge University Hospitals NHS Foundation Trust</td>
<td>Paper-lite</td>
<td>Will scan records when required</td>
</tr>
<tr>
<td>Heart of England NHS Foundation Trust</td>
<td>Paper-lite</td>
<td>May allow notes to be made on paper then scanned</td>
</tr>
<tr>
<td>Hinchinbrooke Health Care NHS Trust</td>
<td>Paper-lite (currently paper-heavy)</td>
<td>Started scanning pilot in spring 2013</td>
</tr>
<tr>
<td>King's College Hospital NHS Foundation Trust</td>
<td>As paperless as possible</td>
<td>Prefers to digitise new records rather than scan old notes, due to illegibility of latter</td>
</tr>
<tr>
<td>Kingston Hospital NHS Foundation Trust</td>
<td>Already paper-lite, will become more so</td>
<td>Planning EDRM project</td>
</tr>
<tr>
<td>Leeds Teaching Hospitals NHS Trust</td>
<td>Already paperless in some departments, hopes for all eventually</td>
<td>Spending £1m on 'paper-lite' projects in 2013-14, mainly scanning</td>
</tr>
<tr>
<td>Moorfields Eye Hospital NHS Foundation Trust</td>
<td>Paperless in respect of trust records on patients (currently paper-heavy)</td>
<td>Planning to remove paper notes from clinics by end of 2013</td>
</tr>
<tr>
<td>North Bristol NHS Trust</td>
<td>Already partially paperless, will be in full within five years</td>
<td>Plans to buy EDRM system in 2013</td>
</tr>
<tr>
<td>Northumbria Healthcare NHS Foundation Trust</td>
<td>Paper-lite</td>
<td>Trust already has the systems required, but will let clinicians use paper for notes then scan them</td>
</tr>
<tr>
<td>Papworth Hospital NHS Foundation Trust</td>
<td>Paper-lite</td>
<td>Depends on participation in eHospital project</td>
</tr>
<tr>
<td>Royal Free London NHS Foundation Trust</td>
<td>Paper-lite by digitising as much paper as possible</td>
<td>Paper seen as useful token and input device in some processes</td>
</tr>
<tr>
<td>Royal Liverpool and Broadgreen University Hospitals NHS Trust</td>
<td>Paper-lite by move to new hospital in 2017</td>
<td>Digitising paper forms used for transfers between departments and letters to other healthcare providers</td>
</tr>
<tr>
<td>University Hospital Southampton NHS Foundation Trust</td>
<td>Paper-lite</td>
<td>Planning EDRM project</td>
</tr>
<tr>
<td>University Hospitals Birmingham NHS Foundation Trust</td>
<td>Paperless &quot;where it is appropriate and safe to do so&quot;, already paper-lite, including being near-paperless for out-patients</td>
<td>n/a</td>
</tr>
<tr>
<td>University Hospitals of Leicester NHS Trust</td>
<td>Paperless clinical record (currently &quot;awash with paper&quot;)</td>
<td>Planning EDRM project</td>
</tr>
</tbody>
</table>
Costs and benefits of EPR projects

The DH has said there is no central money to meet Hunt’s ambition. This means that trusts will need to fund IT projects by generating savings that are at least equal to their costs, or through making cuts elsewhere.

A report commissioned by the government from PricewaterhouseCoopers to support Hunt’s announcement suggested that more ambitious use of IT would save the NHS £4 billion. It argued that £1.7 billion of savings could be generated by projects including EPR, which it described as the use of clinical portals or other solutions to provide clinical and attendance information to staff, e-prescribing in hospitals, and projects outside acute care.

The balance, it contended, would come from the NHS adopting the government’s digital first strategy. The consultancy admitted that additional research would be needed to determine the exact impact of its recommendations, which lacked specific detail.

One cashable saving mentioned by several interviewees was a reduction in the number of unnecessary tests carried out on patients because the results of earlier tests are not available (although this on its own would be unlikely to justify the cost of new systems).

However, the IT directors interviewed for this report did not generally expect to save money through introducing EPR systems. Colin Sweeney, IM&T director at King’s College Hospital, reckoned that after spending 15 years and around £30m on EPR it has broken even, with savings on administrative staff offset by the IT costs.

Instead, interviewees said EPR work is justified by helping healthcare professionals work more efficiently and effectively. This point applies as much to improving IT systems as to removing paper.

For example, University Hospitals of Leicester estimates that it will save its clinicians 20 to 30 minutes a day by moving to a single sign-on system, because they will no longer need to use the multiple log-ins that its systems require at present.
Royal Liverpool and Broadgreen believes that its portal software saves clinicians 30 to 40 minutes per clinic, allowing them to spend more time with each patient or to book extra appointments. James Norman, director of IM&T for the trust, added that the portal reduces clinicians’ stress levels, as they do not have to tell patients that their notes have not turned up.

Some interviewees pointed to other, specific benefits for staff. Michael Mythen, senior programme manager of Northumbria Healthcare NHS Foundation Trust – which covers a large rural area – mentioned secure remote access as a particular advantage.

William Smart, director of IM&T at Royal Free London, expecting improved productivity through EPR to help the trust to move to 24-hour a day, seven day a week working without increasing its staff numbers.

Trusts also expect benefits to include improved patient safety. E-prescribing systems should reduce drug conflicts and known allergic reactions by warning clinicians that they are about to order non-compliant prescriptions. ‘Track and trigger’ systems can also issue alerts if, for example, regular nursing checks are not carried out on time.

Interviewees also mentioned benefits from improved data quality, as a result of information being entered by staff as they work, rather than analysis of poorly-filled in forms.

This will help trusts meet statutory requirements, share data with other organisations and improve internal analysis. Some trusts, including University Hospitals Birmingham, are already using data from their systems for staff education and to improve patient pathways.

Paying for the work wanted by the DH may require trusts to increase their IT budgets. Such increases are expected by eight of the 12 trusts which provided an opinion on their future IT expenditure for this report.

Only two expected stability and two a decline – although one of these, Royal Free London, thought that capital spending would remain stable and possibly increase as it sought to give staff better access to the systems it is now implementing.
Conclusion

The NHS is once again being asked to implement electronic patient records on a very tight timescale. Health secretary Jeremy Hunt has called for trusts to have plans for EPRs in place by 2014, on the way to a paperless NHS by 2018.

This makes it important to understand where trusts are, and what routes are available to them as they seek to make progress.

For this report, EHI Intelligence explored these issues with a selected group of NHS IT directors and others in senior IT roles, working at a tenth of English trusts of different sizes, outlooks and experiences of the National Programme for IT in the NHS.

Given the history of previous attempts to digitise the NHS and the long wind-down of NPfIT, these trusts are at very different stages of digital development. At the extreme, Cambridge University Hospitals is on a “burning platform” – although it is taking dramatic steps to get off it with its eHospital programme with HP and Epic.

Most of the trusts involved in this research are still in the process of implementing EPR systems; while the handful of trusts that have, on their own assessment, got EPR systems fully in place have been working on them for as long as 15 years – and still see further development ahead.

That development takes the idea of an EPR further than it has been traditionally understood. Interviewees defined EPR as being a single source of patient data. However, they had ambitions to create ‘active’ or ‘intelligent’ systems that go beyond the simple digitisation of paper records.

Those trusts with well-established EPR systems are looking to add decision support, automated patient pathways and ‘track and trigger’ alerts based on patient observations. Increasingly, trusts are also recognising that they need to extend records – or at least share the information they contain – with their wider healthcare communities.

NHS trusts vary greatly in their routes to EPR. Indeed, it could be said that there are as many precise routes to EPR as there are trusts. However, these routes can be grouped, and the grouping gives a good indication of where trusts and suppliers should direct their energies when looking ahead.

Very few of the trusts involved in this research had taken the ‘single supplier’ route, and of those that had, one – Moorfields Eye Hospital – was developing its own software.

Other trusts outside this research are embracing single suppliers. These include trusts in the North, Midlands and East of England that are opting for CSC’s Lorenzo under an interim deal with the Department of Health, trusts with legacy systems that are adopting McKesson / System C’s Medway system, and a tiny handful of trusts trying new entrants to the UK market.

But our interviewees suggest that financial pressures, a large installed base of systems, and clinician demand for specific pieces of software, will make this a minority option; leaving plenty of space for the suppliers of integration and portal technologies, particularly where these can contribute to the ‘intelligent’ and ‘active’ systems that trusts aspire to have.

In line with this, many of the IT directors we interviewed recognised the benefits of implementing core, integrated systems and reducing the number of departmental and specialist systems to which they are interfaced as much as possible.
As a result, an increasingly large group of trusts is pursuing a ‘core plus departmentals’ strategy, rather than a pure ‘best of breed plus portal’ approach.

Other common themes emerged from the interviews. Trust IT directors generally agree with the spirit of the latest targets set by the government, but in many cases they do not believe the timescale is feasible or that the ‘paperless’ tag is meaningful or desirable.

Most do not see the point of removing all paper, but instead are aiming to become paper-lite. This would generate many of the benefits that Hunt has cited, in terms of making healthcare easier to access, more efficient, safer, and better information-based.

It will also see trusts buying much the same packages of hardware, software and services. However, their suppliers might consider that it is the cash savings and the staff efficiencies generated that are likely to appeal to trusts; not just the imperative from the secretary of state.

The interviewees came across as pragmatists. Many of them have been trying to achieve aims similar to those now being promoted by Hunt and NHS England for several years. And, while they are utterly committed to reaching them, they have a realistic view of the problems to be overcome.

One of these challenges will be money. Although the government has argued that trusts should be able to generate savings from implementing EPRs and other technology, many interviewees were planning to increase their IT spending and, at best, ‘break even’ on their investment.

Since it is clear that there is unlikely to be a large pot of money for EPR from the centre, this will have to be found from somewhere. Some trusts have moved to give their own technology developments to other parts of the NHS, by using open source development.

Others are working with suppliers to commercialise developments. In both cases, there may be signs of a new model that can generate opportunities to help with marketing, distribution and integration for new users.

A number of interviewees were able to identify some technologies that would deliver immediate, cashable savings in a relatively short space of time.

These included electronic document record management projects, which can reduce the number of staff and the amount of storage space needed to handle paper records, and which are pretty much essential for trusts involved in new-build projects, which are often planned without document libraries.

EDRM projects also start to address the question of what trusts with EPRs should do with ‘legacy’ paper and any notes that they continue to generate; although there are real questions about the cost and utility of scanning.

That said, saving money is not the first priority for most interviewees. John Clarke, chief information officer of University Hospitals of Leicester, argued that: “If I can improve quality, productivity, patient experience and bring that in cost neutral I don’t see why anybody would be unhappy with that.”

This demonstrates the culture of service which interviewees displayed. Many IT professionals like to work, and talk about working, with the latest technology. Those interviewed for this research focused more on supporting their clinical colleagues in providing better care for patients.
Routes to EPR

Trust profiles
Brighton and Sussex University Hospitals NHS Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute trust</th>
<th>Current EPR status:</th>
<th>PAS and standalone departmental systems live</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Core EPR, plus a reduced number of departmental systems</td>
<td>Rating of current suppliers:</td>
<td>4</td>
</tr>
<tr>
<td>Key supplier:</td>
<td>Alert Life Sciences</td>
<td>NHS Number usage:</td>
<td>Joint primary identifier with hospital number – latter necessary for non-NHS patients</td>
</tr>
<tr>
<td>EPR project budget:</td>
<td>£34m over ten years</td>
<td>Interviewee:</td>
<td>Judith Steen, EPR programme manager</td>
</tr>
</tbody>
</table>

**Strategy**

Brighton and Sussex University Hospitals NHS Trust is one year into a three year EPR programme, under which it will implement Alert’s suite as its core clinical software. It plans to retain some of its current departmental systems and its PAS, but integrate these with the Alert software. “In terms of our project objectives, it is one patient record shared across the trust for all purposes. It’s very patient-centric,” said Judith Steen, the trust’s EPR programme manager.

**EPR status**

At the moment, an Oasis PAS is in use across the trust, along with around 15 departmental and specialist systems, including cancer, intensive care and theatres, pathology and radiology. While each of the latter is used across all of the trust’s sites, they are not integrated. “The patient record is scattered a bit,” said Steen, but the EPR project “will be the glue that joins these things together.”

**EPR plans**

Brighton and Sussex is planning to take a phased approach to implementing an EPR from Alert. It will retain its PAS and some of its departmental systems, which will be accessed through Alert.

The trust plans a phased implementation lasting until the end of 2015. The first Alert go-live will be in accident and emergency in October 2013. Ordering tests and communication of results will follow, simultaneously across the trust, then departmental systems one at a time.

Steen said the phased approach was chosen on the basis of cost, because of Alert’s recommendations and – primarily – to minimise disruption to the trust. “We see it as a massive business change programme,” she said, rather than an IT one.

The trust will retain its PAS and some of its current departmental systems on a case-by-case basis, but has already decided to move A&E to Alert. Staff will access the retained departmental systems through Alert. “The idea is that clinicians will use Alert for everything,” said Steen.

The core EPR programme team is split between trust and Alert staff, the latter praised by Steen for their approach to joint working and flexibility. Clinicians have to sign-off changes to business processes caused by the ERP programme in advance, and are well-represented on the groups that plan the changes.

Steen said that changes to clinicians’ working practices represent the greatest challenge for the programme.

**Use of paper**

The trust expects to become paper-lite as a result of its EPR programme, but will not go paperless. “There will be some [paper] left we can’t tackle,” said Steen. The trust does not have a plan to scan the majority of its legacy paper records, although it does undertake a small amount of scanning on demand: “For us it’s practical, what can we achieve with the software, but accepting we can’t get rid of all the paper,” Steen said.

**Costs and benefits**

The trust said in May 2012 that it will spend £34m over ten years on its EPR programme. Steen was not willing to disclose financial details, but she said the trust expects to get a return on its investment in a seven to ten year timescale, with some immediate savings.

The programme should save on transporting paper notes and employing medical secretaries, as well as cutting duplicated tests. There will also be potential savings in replacing some departmental systems with Alert. “The other key one is the reduction in clinical time – things like handover and reporting things between departments,” said Steen.
Cambridge University Hospitals NHS Foundation Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute foundation trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current EPR status:</td>
<td>Some systems in a few parts of the trust; all to be replaced by Epic</td>
</tr>
<tr>
<td>Route to EPR:</td>
<td>Single supplier</td>
</tr>
<tr>
<td>Rating of current suppliers:</td>
<td>3</td>
</tr>
<tr>
<td>Key supplier:</td>
<td>Moving to Epic for all clinical functions, as part of a wider eHospital programme that may also involve Papworth Hospital NHS Foundation Trust</td>
</tr>
<tr>
<td>NHS Number usage:</td>
<td>To become the primary identifier as part of the eHospital programme, to support integration with the other trust that may be involved, Papworth</td>
</tr>
<tr>
<td>EPR project budget:</td>
<td>£200m over ten years</td>
</tr>
<tr>
<td>Interviewee:</td>
<td>Carrie Armitage, eHospital programme director</td>
</tr>
</tbody>
</table>

**Strategy:**

A £200m deal with Epic will see Cambridge University Hospitals replace all of its IT by October 2014, as part of an eHospital programme that may also cover Papworth Hospital. Many technology staff will move to the newly appointed hardware and connectivity provider, HP.

In April 2013, Cambridge University Hospitals NHS Foundation Trust signed a £40m deal with Epic to introduce its EPR software across the trust, having signed a £140m hardware and networking deal with HP a few weeks previously.

A further £20m has been budgeted for implementation work on what the trust calls its eHospital programme, under which it will replace its entire IT infrastructure. The aim is to put Epic live across the whole trust in October 2014, simultaneously for all applications and areas.

eHospital is intended to cover both Cambridge and Papworth Hospital, with the latter planning to move to a new hospital next to Cambridge’s Addenbrookes site in 2017.

There are 73 staff from Cambridge and 17 staff from Papworth working on its implementation, and a plan for a joint IT department.

See the Papworth Hospital entry for more detail on its involvement with eHospital, which had not been confirmed when these interviews took place.

Carrie Armitage, the trust’s eHospital programme director, said IT has been “hopelessly underfunded”, leading to poor infrastructure and clinician complaints about using computers.

As a result, the trust has also contracted with HP to provide a major upgrade to connectivity and hardware. It will pay HP to provide this as a service.

The hardware will include 1,000 touchscreens, one by every bed, computers on wheels (‘cows’) in every ward and computers in every clinic. “We’re flooding the place,” Armitage said. The trust will also allow staff to bring their own devices to work, and enable them to use Android or Apple devices. In total, it plans to have 6,000 access devices for its 7,500 staff (some of whom work in shifts).

Cambridge’s Epic implementation work is being project managed by a small company set up for the purpose. This is headed by Armitage, who previously acted as the trust’s interim IM&T director, and won the business via an OJEU procurement. Around half the trust’s IT staff will move to HP under TUPE regulations, while the rest will provide an “intelligent customer function”, setting strategy and managing clients. “You can’t outsource responsibility for strategy,” Armitage said.

The trust started eHospital two years ago, but Armitage said that government pressure to move to electronic records has been helpful in justifying the project to the trust’s board.

**EPR status**

Armitage said that Cambridge has “a burning platform”, requiring it to replace everything; for example, its hospital information system is 18 years old, uses green screen displays, and is not supported by a supplier. And while it has systems for document management and e-prescribing in oncology, integration is “really poor.”
EPR plans

Cambridge is looking to Epic to deliver advanced functionality such as workflow, clinical decision support, a patient portal and persistent sessions. All parts of the trust will move to Epic simultaneously.

Epic will not only digitise records, but also provide workflow and clinical decision support. Armitage said these represent key extra functionality, as they will make the computer a tool for clinicians to do their jobs, recording data as a by-product rather than as an extra task.

“You can build up bundles of care that prompt the staff to do things, to make sure the patient pathway is followed,” she said. For example, a junior doctor ordering a test can be told by the system that the same test has been run every day for the last three days and was normal each time, so the trust’s policy is that a further test is not required. Staff will be able to override the system’s recommendations, but this will be recorded.

Epic will also provide a patient portal service with online communication, MyChart. This is used by US customers to let patients communicate directly with clinicians; however, it will not be used this way by Cambridge, as there is no way to pay for clinicians’ time.

Armitage said the trust aims to give patients access to their records, but it will be tricky to work out how to deal with responses. However, MyChart will enable patients to receive one-way communications, such as test results, at the same time as their consultants. This will remove the need for the two-minute outpatient appointments that are currently used to pass on results.

Staff will have device-independent ‘persistent sessions’ with the Epic software, allowing them to move device and pick up where they left off, after logging-in with a swipocard. The devices will effectively function as thin clients – “but we don’t care, we’ve bought a service”, said Armitage, for which is paying per user, rather than per device.

Armitage said that going live across the trust simultaneously is less disruptive in some ways, as it avoid some wards being on and others being off. However, she added “it is going to be disruptive”, and the trust plans to do significantly less elective work around the go-live date. The 18 month timescale is that advised by Epic. The trust will effectively act as its own systems integrator.

The greatest challenges will be those of leadership, and in changing the way staff work to get the best out of the new system, she thought. The trust has established a design authority, almost entirely staffed by the hospital’s consultants, to take responsibility for everybody to use the Epic system. “The really big challenge in EPR is not letting everyone do their own thing,” Armitage said.

Cambridge is Epic’s first significant UK customer, and Armitage said it is putting massive attention and work into the project, describing it as “an extraordinary company” and very focused. However, she added that it is building a generic NHS system through this, rather than one that will only work for one trust.

Use of paper

The trust will not go paperless as a result of the eHospital programme, with HP’s contract including a managed print strategy. The trust already has a system for scanning paper records, but these will be done as required, rather than wholesale. Armitage said that “on the whole, paper will fall out of the system”, and she is looking forward to digitising the “scrappy notes” that are currently used for tasks such as handover between shifts.

Costs and benefits

The trust expects to save money as a result of the £200m eHospital programme, despite approximately doubling its IT spending. The business case includes reduced costs from adverse drug events and damage to patients, less testing (by cutting unnecessary and duplicate tests), fewer problems with allergic reactions, less variation in clinical care, and productivity benefits. In time, the trust expects to cut £15m annually through such savings, although this is offset by increased IT spending.
Heart of England NHS Foundation Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute foundation trust</th>
<th>Current EPR status:</th>
<th>Live but still evolving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Best of breed with portal</td>
<td>Rating of current suppliers:</td>
<td>4-5 for products; 3 for support</td>
</tr>
<tr>
<td>Key suppliers:</td>
<td>Orion, Rhapsody and in-house</td>
<td>NHS Number usage:</td>
<td>Secondary to the trust’s own patient identity number, although the trust intends to make the NHS Number its primary identifier in future</td>
</tr>
<tr>
<td>Annual IT budget</td>
<td>£11.34m</td>
<td>Interviewee:</td>
<td>Andy Laverick, chief information officer and director of IT</td>
</tr>
</tbody>
</table>

Strategy

Heart of England NHS Foundation Trust has developed its own EPR over the past decade, and follows a best of breed strategy. In 2011 it started scanning paper records and migrating to Orion’s Concerto clinical portal. The latter joins up its various systems, using Rhapsody software and HL7 interoperability.

EPR status

Heart of England has developed its own EPR software, iCare, over a number of years. It is unusual in not having a unified PAS. Instead, it has developed the relevant functionality in modules, using the Rhapsody integration engine to link its systems, and giving clinicians access through a portal.

Heart of England has developed its core EPR software, iCare, over the past ten years. The trust is unusual in having no unified PAS software. It had an old system running on AS/400 hardware, but rather than replace it in full it broke the functionality into modules, such as waiting list management; some of which it wrote in-house and some of which it bought in.

Andy Laverick, the chief information officer and director of IT, said this approach has given the trust much more control than if it had used a single supplier. He also argued the single supplier route would have meant compromising on departmental systems; the trust’s approach allows departments such as accident and emergency to use distinct systems. However, he acknowledged that the trust is in the fortunate position of having a good development team.

Heart of England uses Rhapsody’s integration engine and the HL7 messaging standard to support the linking of all its systems. This includes those at Good Hope Hospital, a former trust acquired by Heart of England in 2007, which Laverick said is now at a similar level to the rest of the trust when it comes to its IT.

The trust has been implementing Orion’s Concerto clinical portal since 2011 to present its underlying systems to clinicians as a virtual single whole. Concerto provides a personalised, configurable view to users, including automatic alerts. It incorporates a number of security features, so that, for example, any non-clinician looking at a patient record has to provide a recorded reason; and this requirement is extended to doctors for sensitive data such as HIV results.

Users access Concerto through ward PCs, computers on wheels and mobile devices including iPads, with access to mobile devices handled through the use of Citrix software. The trust is considering a bring your own device policy.

In 2009, the trust committed to scanning paper records, and started doing so in 2011. It has, so far, scanned more than 700,000 volumes and more than 170m images, which are now available through the iCare EPR. Laverick said the trust has found there are limits to the indexing, so the trust has created “skinny notes” with paper removed as far as possible. The trust still uses paper forms.

Heart of England sends blood results and information on A&E attendance to GPs, and also provides them with log-ins to its EPR if they wish. However, it currently has no access to GP records.

EPR plans

Heart of England plans to digitise some 800 paper forms, and in spring 2013 it was moving theatre notes from paper to electronic format. Laverick said it intends to reconsider processes as it does this, and use reusable software modules rather than create separate ones for each form.
The trust is also participating in a programme to create a single care record for Birmingham and Solihull. This may cover all local health and social care providers, including University Hospitals Birmingham and Sandwell and West Birmingham Hospitals trusts, although Laverick said the project is at an early stage. Heart of England also hopes to gain access to local GP records.

The trust usually uses its own staff for implementation and management, although it sometimes uses a supplier to help set up a proprietary system. Of the challenges, Laverick said: “It’s always cultural. We can always overcome technical issues.”

**Use of paper**

“We’re on our journey to being paper-lite,” said Laverick. While the trust is digitising its paper forms, it may continue to allow notes to be made on paper and then scanned afterwards. He added that it will take years to embed changes, not least because older clinicians want to use paper until they retire. This may mean the retention of some vestigial paper notes.

**Costs and benefits**

Laverick said the trust’s IT spending is split between several departments, with A&E, PACS and pathology systems paid for separately, and A&E having its own IT manager. However, the core budget has been approximately £7m-8m revenue and £3m capital over the last few years. The trust treats digitisation as on-going work, rather than as a specific project.

The main clinical benefit of the trust’s EPR work is giving staff and other local NHS personnel “any time, any place” access to patient data, as well as giving patients more information for self-management. Laverick said the trust can also use the system to start developing more intelligent safety alerts, such as a warning that a patient has not been fed.

The key productivity benefit comes from less spending on the logistics, storage and handling costs of paper records. Laverick said that, over a period of years, these savings have exceeded the cost of the trust’s scanning programme.
Hinchingbrooke Health Care NHS Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute trust</th>
<th>Current EPR status:</th>
<th>Live</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Best of breed with clinical viewer</td>
<td>Rating of current suppliers:</td>
<td>4</td>
</tr>
<tr>
<td>Key supplier:</td>
<td>Ascribe</td>
<td>NHS Number usage:</td>
<td>Extensive, but the hospital number is used as well; particularly for the large minority of patients from Eastern Europe</td>
</tr>
<tr>
<td>Annual IT budget</td>
<td>£3.3m</td>
<td>Interviewee:</td>
<td>Gordon Greaves, associate director of IT</td>
</tr>
</tbody>
</table>

**Strategy**

Hinchingbrooke Health Care NHS Trust has taken an incremental approach to developing its EPR systems, a strategy that has been challenged by Circle, the private firm that started managing Hinchingbrooke on a ten-year contract in early 2012.

Gordon Greaves, associate director of IT, said the company started with a vision that did not fit with the trust’s operational experience, and that it had been “quite a honeymoon.” However, the trust has a greatly increased IT capital budget for 2013-14, paying for new hardware such as a data centre which will help support its move toward becoming paper-lite.

**EPR status**

Overall, Greaves said: “We have had an incremental approach. We have never, and we never will have, a huge investment in IT.” Despite this, he said the trust is well-placed when it comes to basic EPR functionality. “We have, for something like the last ten years, effectively had an electronic patient record,” he said.

Hinchingbrooke digitised x-ray and diagnostic results six years ago, and sends letters to GPs electronically. Its outpatient department is entirely electronic, but inpatient treatment is not, and the trust still makes significant use of paper records. It has around 500,000 paper records, and half of these are still active.

The trust uses a clinical viewer from Ascribe for access to systems, which Greaves said works well – the trust has used the supplier for 20 years, is a reference site, and trials its new software. Local GPs are offered access to the clinical viewer through a portal system.

While the trust relies on Ascribe, and could not afford to move all its systems away from it, Greaves said it is able to exercise choice. For instance, it changed its radiology information system from its main supplier to Healthcare Software Systems’ CRIS.

**EPR plans**

Hinchingbrooke has taken an incremental approach to developing an EPR, and is still ‘paper-heavy’. However, it is planning an increase in capital expenditure, and some substantial projects, such as scanning paper records.

In spring 2013, Hinchingbrooke was about to start scanning paper records and adding them to its EPR. It was planning to do this via a trial run with Ascribe, using the notes of 13,000 deceased patients.

If successful, the scanning project should reduce, but not remove, the trust’s use of paper for inpatients; but it will also require a significant investment in hardware. Greaves said
the greatest challenge in new work is money. “I don’t see the technology as a problem.” The trust is planning a big increase in capital expenditure, which will pay for items including a new data centre. Greaves said this was about “catching up” after a period of under-spending.

The trust’s implementation work is undertaken by a mixture of staff and suppliers. In spring 2013, the trust had just expanded its IT department to 22 people, but it still does not have its own coders. While it would be possible to outsource the scanning of paper records, Greaves said some expertise is required to correctly classify parts of the record and to comply with legal requirements, which makes this an expensive option.

Use of paper

Hinchingbrooke’s treatment centre, opened in 2005, was planned as paperless, but the trust eventually decided it should instead be paper-lite – the use of paper has to be justified, but is allowed. Overall, Greaves added: “We have recognised we cannot be paperless across the trust in five years. We can go paper-lite.” He said that, at present, the trust is still “paper-heavy.”

Costs and benefits

The trust’s £1.86m IT budget for 2012-13 included £1.4m revenue and £300,000 capital. Greaves said that capital spending would rise significantly in 2013-14 to £1.8m, along with a slight increase in revenue spending, to a total of £3.3m. The document scanning pilot will cost around £50,000.

Among the benefits from improved systems, Greaves included the ability to access data in more timely fashion and make better use of it, for example for modelling, looking at how different doctors work, and focusing on their results.

Productivity benefits will be generated by saving staff time, and by reducing the number of posts that handle paper records. In spring 2013, the trust had 14 staff doing this, but Greaves said this number could be reduced to four when the trust has moved fully to electronic records.
King’s College Hospital NHS Foundation Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute foundation trust</th>
<th>Current EPR status:</th>
<th>Live</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Best of breed with active portal</td>
<td>Rating of current suppliers:</td>
<td>4</td>
</tr>
<tr>
<td>Key supplier:</td>
<td>CSC</td>
<td>NHS Number usage:</td>
<td>The trust uses the NHS Number when sharing information, for example with GPs. However, not every patient has one, including those from overseas</td>
</tr>
<tr>
<td>Annual IT budget</td>
<td>£9.26m</td>
<td>Interviewee:</td>
<td>Colin Sweeney, director of IM&amp;T</td>
</tr>
</tbody>
</table>

Strategy

King’s College Hospital NHS Foundation Trust has a richly functioned EPR system working across the organisation, and is undertaking only incremental work to improve this. However if, as expected, it takes over the Princess Royal Hospital in Bromley as a result of the dissolution of South London Healthcare NHS Trust, it will have to extend its systems there.

It is also considering a merger with its partners in King’s Health Partners academic health sciences centre - Guy’s and St Thomas’ and South London and Maudsley trusts. And it is part of the South London integrated care programme, which plans to share patient data across the area’s NHS organisations.

EPR status

King’s has been working on its EPR development for around 15 years, and has been cited by health secretary Jeremy Hunt as an example of trust with plans in place to go paperless. Its strategy is built around CSC’s iPM and iCM software, with the latter acting as an ‘active portal.’

The trust has been working on EPR development for around 15 years and now has systems in place that include PAS, order communications and results review, electronic prescribing and medicines administration, clinical documentation and correspondence, access to PACS images and all observations.

Director of IM&T Colin Sweeney said the system has some elements of decision support in place, but not all, with drug interactions currently missing.

King’s uses CSC’s iSoft patient manager (iPM) as its PAS, but decided against relying on one supplier for everything. “We had systems in place and we didn’t want to throw any out, particularly those that had been implemented quite recently,” said Sweeney, adding that these included pathology and radiology.

“We felt that we needed a route whereby people could access the information in those systems, but we could build on the systems that we had in place at the time. We did think about an ‘all singing all dancing’ product, but when we looked at them they did things, but they didn’t necessarily do things in the best way."

King’s uses CSC’s iSoft clinical manager (iCM) as what Sweeney described as an active portal. “When I say it’s an active portal, it’s because you’re actually inputting information, you’re not just viewing information. You are prescribing in there; you are recording the administration of the drug in that system.”

Users can also view results, review documents and scanned correspondence, add notes and record some data within electronic forms, request tests and procedures, prescribe drugs electronically and record their administration.

EPR plans

King’s will digitise paper forms; buy a managed service to scan paper records; and digitise non-PACS images. The trust usually uses its own staff for development, and has some concerns over the future of its CSC software.

King’s plans to digitise some forms that are currently completed on paper and then scanned. To do this, it will use technology it already has in place. These include the King’s specialty system framework, developed in-house and already in use in trauma and orthopaedics, and Wardware, an open source nursing observation system developed by the trust with suppliers Airslie and Tactix4.
The latter is currently used for capturing vital signs, but Sweeney said it could be extended to nursing assessments, too. King’s nurses increasingly use iPod Touch hardware, on which Wardware is designed to work, letting them record information at the bedside.

King’s will also scan some historic paper records to which access is still needed. For this, Sweeney said it is likely to buy a managed service through a procurement. This system could also be used for the records of Bromley’s Princess Royal.

The trust further plans to digitise non-PACS images, such as photographs and microscope slides, which are not currently available through the EPR. Sweeney said the trust is considering various products, including a vendor-neutral archive, to manage the resulting data store. It is also likely to buy a product to manage the capture of images and link them reliably to the right patient records.

In general, King’s uses its own staff for development and for most other work, although it plans to make an exception for the scanning work. “Our experience has been that it is extremely costly,” said Sweeney of using external service providers. “It’s been easier to do things ourselves, quicker to do things ourselves, and if we make mistakes they are not as costly [to rectify] as getting external people to help us do things.”

Sweeney said the biggest challenge with the trust’s EPR work has been “managing the demand”; as soon as people realised the system was working well, they started asking for new things, and these have needed prioritisation.

However, the trust may face some tricky issues with its underlying software in the near future. King’s has a licence for the iPM and iCM software that runs until 2016. iPM is supported as a managed service, while the trust does most of its own iCM management.

Despite this, Sweeney said he has concerns over the future of iCM and particularly iPM, given that CSC – which bought iSoft last year – now has a new flagship product; Lorenzo. He also pointed out that the old iPM software is Windows-based, and not optimised for newer devices.

Use of paper

Sweeney said that King’s is paper-lite, and aiming to be “as paperless as possible.” He argued it is better to have records digitised, so they are always available for use at any location in a legible fashion - concerns about legibility are one reason the trust has done relatively little about scanning paper records.

Sweeney argued the trust’s approach makes ease of use a priority; if digital systems are not easy to use, staff will scribble a note and then, perhaps, enter that information later. Some clinics at King’s already run without paper notes, and this is also true of ward rounds and drug rounds on wards. However, clinicians still tend to make paper notes on wards.

Costs and benefits

The trust’s IT spending, on revenue, costs and capital allocations, of around £9.26m has been squeezed in recent years because of the requirement to equip new theatres and buildings with hardware. Sweeney said the budget will increase with the likely takeover of Princess Royal in Bromley.

King’s will spend approximately £1m on capital and managed service costs on its current set of development plans. Sweeney said that the trust has spent around £30m on developing its EPR, but has done so over 15 years, at around £2m annually.

On benefits, Sweeney said that better use of staff time is the main productivity advantage, and that this leads to better patient care, greater safety, faster healing and an earlier discharge. It also allows for comparisons of clinicians’ practices and outcomes, which should enable them to learn from each other and establish best practice.

Sweeney said that King’s has broken even, rather than saved money, through its EPR work. He added that the trust’s finance director once said to him “don’t come to me and say you’re going to save lots of money by putting this system in” because he recognised that savings on administrative staff will generally be offset by the IT costs, unless people are being made redundant as a result – which has not been the case at King’s. Instead, the work is justified by improvements in quality.
Kingston Hospital NHS Foundation Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute foundation trust</th>
<th>Current EPR status:</th>
<th>Live except e-prescribing, which is to be added from June 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Core integrated system, complemented by best of breed including a portal</td>
<td>Rating of current suppliers:</td>
<td>4</td>
</tr>
<tr>
<td>Key supplier:</td>
<td>Cerner</td>
<td>NHS Number usage:</td>
<td>“As much as we can and where it is possible to do so”</td>
</tr>
<tr>
<td>Annual IT budget</td>
<td>£3.63m</td>
<td>Interviewee:</td>
<td>Anthony Brewer, director of IM&amp;T</td>
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</table>

### Strategy

Kingston Hospital NHS Foundation Trust uses Cerner’s Millennium suite for many functions, but not to the exclusion of other systems. It will soon add electronic prescribing and clinical documents, and is developing a strategy to go paper-lite, although this has yet to be adopted by the trust’s board.

### EPR status

The trust implemented Cerner Millennium with a ‘big bang’ approach. Director of IM&T Anthony Brewer said an integrated system “is safer and requires less maintenance of interfaces.” But he added that using a single supplier for everything may not mean getting best value, so “it’s good to maintain some competition and to keep an open mind. It means that we can decide on any new system on its merits.”

### EPR plans

Kingston is building on a ‘big bang’ implementation of Cerner Millennium. It introduce e-prescribing this year, and is planning to buy a clinical portal and electronic document management.

The trust will put an e-prescribing system live in June 2013, and next intends to introduce a vendor-neutral archive. After this, it plans to buy a clinical portal and an electronic document management system.

Implementation work will be carried out by a combination of trust staff and the relevant suppliers. “Every solution will have a different answer,” said Brewer. The two main challenges in implementation come from finding resources (both people and funding) and getting staff to adopt the new systems, “because people don’t like change.”

### Use of paper

Kingston considers itself to be paper-lite – not in the vanguard, but in the tier below, Brewer said. “There will always be paper in the organisation, not least because I am sitting here with a notepad and a bunch of notes scribbled on it and there’s no reason why everything will need to be paperless.” The planned electronic document management, with the VNA, will reduce the trust’s paper levels further.

### Costs and benefits

The trust may need to increase its IT spending in the future, Brewer said. It expected to see a positive return on investment from its EPR programme, although was not prepared to disclose figures. In terms of specific benefits, reducing reliance on paper records should improve safety through immediate access to records and save money by reducing staff and storage costs.
Leeds Teaching Hospitals NHS Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute trust</th>
<th>Current EPR status:</th>
<th>Live in part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Best of breed with portal</td>
<td>Rating of current suppliers:</td>
<td>No rating (“I don’t think there is anyone we are dissatisfied with”)</td>
</tr>
<tr>
<td>Key supplier:</td>
<td>In-house</td>
<td>NHS Number usage:</td>
<td>Primary identifier, with partners moving towards this – Leeds City Council social care now has NHS Number on 95% of its records</td>
</tr>
<tr>
<td>Capital IT budget</td>
<td>£8m</td>
<td>Interviewee:</td>
<td>Eileen Jessop, deputy director of informatics</td>
</tr>
</tbody>
</table>

**Strategy:**

Leeds is developing an EPR incrementally, with significant use of in-house, open source development, supported by its integration provider, InterSystems, and a local university.

Leeds Teaching Hospital NHS Trust is developing its EPR incrementally, with significant use of in-house, open source development. The trust is part of an informatics board that includes social care, mental health, community and primary healthcare providers. This is building an integrated Leeds Care Record and developing joint-working in other ways.

“As a service user, I would expect my electronic patient record to have everything in there that is known about me from all the clinicians that have ever done anything to me. So whether that’s in social care, primary care, mental health or secondary care I would expect it in there,” said Eileen Jessop, the trust’s deputy director of informatics.

**EPR status**

The trust has its in-house clinical portal live across the trust. This is linked to its own results server and around eight other departmental, trust and external systems. These include the trust’s Ascribe A&E system, an in-house cancer pathway system, its WinDip/Mongoose scanned record with search engine service, Bluespier discharge letters and one local primary care system, Emis.

Jessop said that the trust’s best of breed strategy aims to produce a richer source of information, through a high level of flexibility in its data and systems.

**EPR plans**

Leeds is rebuilding its open source cancer patient pathway management system, through in-house work with support from Leeds University and Ocean Informatics. Jessop said one reason for using open source is to build a standard, at least in terms of presentation, that will save on retraining doctors when they transfer between NHS organisations.

Leeds is in the process of implementing a maternity system, both in the trust and in local primary care, again with the support of Ocean Informatics, by spring 2014. It also plans to introduce electronic prescribing on the same timescale.

For this work Leeds uses a mixture of its own staff and staff from InterSystems, which provides its integration platform, the university and Ocean Informatics. Jessop said the trust lacks some expertise in technical and clinical systems architecture, which it will address both through hiring staff and procuring services.

Jessop said that the greatest challenge in implementing EPR is reliable hardware and communications infrastructure, which “we don’t have at the moment.” To this end, Leeds plans to improve its hardware infrastructure, including data centres, storage and disaster recovery. “We can’t do e-prescribing until we’ve got that in place, because you can’t have things failing,” she said.
Use of paper

Leeds is completely paperless in a number of departments, which Jessop defined as “no paper at all, to do anything”. Several others are paper-lite. While it will be “a challenge”, Jessop said that she believed it will “eventually” be possible to make the trust completely paperless, but not yet. “I just don’t think the technology is there or easy enough to use yet in order to achieve a completely paperless environment,” she said.

Costs and benefits

The trust spent around £8m in capital IT spending alone in 2013-14, up from around £6.5m the previous year. Around £1m of the 2013-14 capital budget was likely to be spent on ‘paper-lite’ projects, the majority on scanning documents, while Jessop estimated the total cost of the maternity and e-prescribing implementations as being around £2.5m.

Jessop said that the clinical benefits of its EPR work include no more searching for notes, reducing delays in clinics, clinicians making better decisions through having fuller information, and avoiding unnecessary repeated tests – in some cases, reducing patients’ exposure to radiation, as well as saving time and money.

E-prescribing, in particular, should boost the trust’s ability to dispense drugs safely. The administrative benefits include more potential for research and for clinical decision support. They also act to improve data quality, by exposing poor information – Jessop quoted the trust’s chief clinical information officer, Tony Shannon, who has called this process “sun-shining the data.”
Moorfields Eye Hospital NHS Foundation Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>Specialist acute foundation trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Building its own open source system, OpenEyes</td>
</tr>
<tr>
<td>Rating of current suppliers:</td>
<td>5 (although it supplies itself)</td>
</tr>
<tr>
<td>Key supplier:</td>
<td>In-house</td>
</tr>
<tr>
<td>NHS Number usage:</td>
<td>Collected where available, but around 10% of patients cannot provide it</td>
</tr>
<tr>
<td>EPR project budget:</td>
<td>£4.5m over five years</td>
</tr>
<tr>
<td>Interviewee:</td>
<td>Bill Aylward, consultant, former medical director and development leader for OpenEyes</td>
</tr>
</tbody>
</table>

**Strategy**

Moorfields Eye Hospital NHS Foundation Trust started planning its open source EPR OpenEyes in 2010, which it uses for new data recorded in electronic form. It aims to replace new paper records with electronic ones by the end of 2013.

Bill Aylward, the trust’s former medical director and the project’s development leader, said that “pretty much everything” he was asked to do as medical director, including ensuring patient quality, collecting data for auditing, revalidation and productivity, and introducing patient safety measures such as decision support “is not possible with paper records.” Therefore, he is looking to create “the best possible EPR”, working in a highly efficient manner. Having surveyed the market in 2010, and based on its previous experience with commercial systems, the trust came to the conclusion that it should build its own.

Aylward gave an example of why. When primary care trusts asked Moorfields for more data on the outcomes of a very expensive new injection, which required two or three new data fields, the supplier of the relevant system took nine months and charged £40,000. “That is not acceptable. We needed something that is very agile and flexible, and by those criteria alone, pretty much everything in the market failed,” he said.

Aylward is working with a team of around eight or nine staff. “We should have all of the sub-specialties covered – there are nine within ophthalmology – so that every clinician, instead of reaching for a pen will reach for a mouse and a keyboard,” he said. But he also stressed: “A lot of what we’ve done is not just applicable to ophthalmology. We’ve got a framework and it’s all open source, so it’s freely available. Other trusts can just take it and build on it; that’s really the idea.”

**EPR status**

OpenEyes system is live and parts of it are in use across the trust, but it is not fully rolled out. It covers all inpatient bookings – although the trust mainly treats day patients and their operation bookings are run through its Silverlink PCS PAS, a separate system that is integrated with OpenEyes.

The system also includes e-prescribing, with all prescriptions covered, and all trust correspondence. It is further used for clinical examinations (history and findings) operation notes for cataracts - one of the trust’s nine clinical specialties - and for a few other documents, including consent forms.

**EPR plans**

OpenEyes, an in-house, open source EPR, will be used across Moorfields by the end of this year. It will also act as a clinical portal for the separate PAS and document management systems.

Moorfields plans to extend the use of OpenEyes to all clinical examinations and operation notes by the end of 2013. It also plans to use it as a portal to 18 other clinical systems, currently requiring separate log-ins, for other data such as blood tests, x-rays and other images.

The trust does not plan to replace its PAS this year, although it will move A&E correspondence from this system to OpenEyes. Eventually, it would like to move entirely to its own system. However, Aylward said that while OpenEyes can handle outpatient operation bookings, it would be a “very long and very expensive” process to make it compliant with the NHS’s national Choose and Book electronic booking system.
At the moment, Choose and Book letters arrive electronically but have to be printed, passed around the trust and then scanned. Aylward said “there are very encouraging signs from the centre that that process will be easier” for integrating with Choose and Book in the future.

In terms of further development, Aylward said the trust plans to add “decision support and alerts, training, business policies, all the things that are really quite exciting about having an EPR.” All implementation work will be carried out by trust staff.

The trust does not see document management as part of EPR, and plans to find an external supplier for this; although any system chosen will need to integrate with OpenEyes. It is considering scanning and electronic document management for specialties where old records are of particular use.

This includes records for patients with glaucoma, a chronic condition for which records spanning a number of years are needed to decide on treatment. For other specialties, in which old records are rarely of use, one option is "not make notes available electronically, but to have them on demand," said Aylward.

Costs and benefits

The trust planned to spend £4.5m on OpenEyes over five years, but expects to generate total savings over the same period of £5.5m. Aylward said the clinical benefits include the reliable availability of records, even if a patient attends unexpectedly; with paper notes, 10% to 20% of records are missing during consultations.

Decision support will prevent clinicians prescribing drugs to which a patient is allergic, and help with processes such as consent, by providing all the risks and benefits of a given procedure. Collecting data will help managers and clinicians spot problems.

On productivity, the trust expects the electronic versions of forms to be faster to complete than paper ones, since it should be possible to pre-populate much of the data. OpenEyes allows users to enter drawings in some cases.

Aylward added that outcomes data on ophthalmology is not collected through the Hospital Episode Statistics system in the way that it is for cardiology surgeons. Moorfields wants to collect similar performance data for its surgeons, and will use OpenEyes to do that.
## North Bristol NHS Trust

<table>
<thead>
<tr>
<th>Type of trust</th>
<th>General acute trust</th>
<th>Current EPR status</th>
<th>Partially implemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR</td>
<td>Best of breed with in-house portal</td>
<td>Rating of current suppliers:</td>
<td>3</td>
</tr>
<tr>
<td>Key supplier</td>
<td>Cerner Millennium (PAS, A&amp;E, theatres, clinical documentation)</td>
<td>NHS Number usage:</td>
<td>No – “should/will do” but no plans in place for use as primary identifier</td>
</tr>
<tr>
<td>EPR project budget</td>
<td>£35m over ten years</td>
<td>Interviewee:</td>
<td>Mike Brooks, interim head of IM&amp;T (written answers)</td>
</tr>
</tbody>
</table>

### Strategy

North Bristol NHS Trust already uses Cerner’s Millennium in several areas, having introduced it in late 2011 under the National Programme for IT in the NHS. The deployment was made in advance of the trust’s occupation of a new hospital in spring 2014, that is currently under construction at its Southmead site.

Mike Brooks, the interim head of IM&T, said that a good EPR would make the data already available on paper “available in real time to anyone at any time”; a better EPR would add real time specialist information, more data to support complex cases and long-term conditions, and non-printable material such as images and ultrasound; while the best EPR would also add intelligence and decision support, including automatic alerts and guidance on patient pathways and best practice.

### EPR status

Brooks said North Bristol has all the core pieces of software it needs to get to EPR, except e-prescribing and electronic document management.

### EPR plans

North Bristol is aiming to build on the Cerner Millennium system it deployed through NPfIT while developing its own in-house portal to give clinicians access to other departmental systems, where these are retained.

North Bristol is aiming to get to the ‘better’ EPR stage outlined by Brooks, by moving to a system that will hold all records and provide some extra functionality. To do this, the trust plans to buy a ‘fully bundled’ system capable of delivering what is already provided by Cerner (PAS, A&E, theatres, clinical documentation), but also adopt a best of breed approach through use of a clinical portal.

Brooks said this will give North Bristol four options for departmental systems: to make them part of the fully-bundled system; to buy software off the shelf; to develop it in-house; or to extend a system already in use in the trust. He added that reaching the ‘best EPR’ status may mean spending more on the ‘fully bundled’ core software.

The trust is developing its own in-house portal, which Brooks described as an “in-house browser based development” that can be used on any device including tablet computers.

Its future plans are to buy an electronic document management system in 2013, and then find a new contract to replace its existing deal with Cerner when this runs out in 2015 (the trust issued an OJEU tender few weeks after interview, in May 2013). Brooks said that “funds” will present the biggest challenge to this work.

### Use of paper

The trust is partially paperless, and Brooks said it will become paperless in five years, defining this as all internal data and documentation being captured and stored electronically, either in a structured form in the EPR system or scanned from paper and held in the document management system. He added that the systems already in place or currently being purchased will enable this.

### Costs and benefits

The trust is increasing its £6.63m 2012-13 IT budget, as a result of moving to its new hospital. It plans to spend £35m over ten years, subject to approval for the outline business case, on e-prescribing, the clinical portal and electronic document management, to augment the already-approved project to replace the existing Cerner contract.

Brooks said the justifications for the work include national directives, patient safety, efficiency and the design of the new hospital. It will also allow real-time data entry, which should improve data quality. While it will not release cash, the projects “should free up clinical time to focus on patient care.”
Northumbria Healthcare NHS Foundation Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute foundation trust</th>
<th>Current EPR status:</th>
<th>Partial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Best of breed with portal</td>
<td>Rating of current suppliers:</td>
<td>4 (Clinical portal)</td>
</tr>
<tr>
<td>Key suppliers:</td>
<td>Orion Health and Sunquest</td>
<td>NHS Number usage:</td>
<td>Not the trust's primary identifier. Although it will use the NHS Number for as possible, the trust has a significant proportion of Scottish patients (the NHS Number is only used for English and Welsh patients), which will expand with its acquisition of North Cumbria University Hospitals NHS Trust. It will also continue to use trust numbering for paper records, while these are retained.</td>
</tr>
<tr>
<td>Annual IT budget</td>
<td>£9.3m</td>
<td>Interviewee:</td>
<td>Michael Mythen, senior programme manager</td>
</tr>
</tbody>
</table>

**Strategy**

Northumbria Healthcare NHS Foundation Trust “adopted a strategy several years ago of taking a best of breed approach using a clinical portal,” according to Michael Mythen, its senior programme manager.

This will build into an EPR over time, which Mythen defined as “all relevant clinical information from the appropriate systems.” He added that: “Our strategy is to grow that and move to a paper-lite environment.” The trust’s vision is to enable its clinicians to use systems appropriate to their requirements, without being constrained by a single, monolithic system.

**EPR status**

The trust’s electronic record includes patient encounters including history, clinical correspondence, pathology, radiology and PACS. From the clinical portal, which is trust-wide, it is also possible to order pathology tests and, from May 2013, radiology examinations.

**EPR plans**

Northumbria has adopted a ‘best of breed’ strategy built around a clinical portal, to which it is planning to add e-prescribing and electronic forms with the ambition of creating a ‘paper-lite’ environment.

Northumbria is currently implementing Ascribe’s electronic medicines management system as part of a strategic goal to introduce e-prescribing. Following on from that, it plans to add other information sources to the clinical portal, including endoscopy and cardiology reports, add more electronic forms, and expand order communications.

Implementation work is carried out by the trust’s project team with assistance from suppliers. Mythen said that the greatest constraint on developing its systems will be resources, and demonstrating that spending can generate either savings or improved services.

**Use of paper**

Mythen said the trust has the systems to become paper-lite. He said it had looked at work in Glasgow on ambulatory care. “They generate paper but then it’s immediately scanned after the appointment,” he said. “That approach, together with an increased reliance on electronic forms and documentation, will begin to remove the paper from the system and make the electronic information more readily available through the clinical portal.”

Mythen added that it would be “incredibly difficult” to remove paper from the entire clinical process, when clinicians need to make immediate notes or draw diagrams for patients. Instead, the trust wants to scan all appropriate paper for the EPR.

**Costs and benefits**

Mythen expects the trust’s £9.3m IT budget for 2012-13 to remain stable, although there will be an additional £2m to £3m to be spent on systems to develop its EPR over a number of years.

He said that the benefits of EPR include immediate access to comprehensive records for clinicians wherever they are, including remote secure access – which is particularly useful given the trust covers around 3,000 square miles of the north-east of England.

He argued that moving to EPR should also save money on moving paper records, and provide clinicians with improved decision support. However, the majority of the benefits will come from qualitative improvements rather than financial savings.
### Papworth Hospital NHS Foundation Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>Specialist acute foundation trust</th>
<th>Current EPR status:</th>
<th>Live, across most wards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>PAS plus departmental systems (currently), single supplier (as part of the eHospital project planned with Cambridge University Hospitals NHS Foundation Trust, but not confirmed at the time of interview)</td>
<td>Rating of current suppliers:</td>
<td>3.5</td>
</tr>
<tr>
<td>Key suppliers:</td>
<td>Epic and HP (as part of eHospital)</td>
<td>NHS Number usage:</td>
<td>99.7% compliant – the NHS number is used as the hospital number, although there are alternatives</td>
</tr>
<tr>
<td>EPR project budget:</td>
<td>£40m over ten years</td>
<td>Interviewee:</td>
<td>Michael Moore, head of technology and systems</td>
</tr>
</tbody>
</table>

#### Strategy

Papworth Hospital NHS Foundation Trust, the UK’s largest specialist cardiothoracic hospital, and its main centre for lung and heart transplants, has the option of joining Cambridge University Hospitals’ eHospital programme. This would see it adopting Epic for EPR software and HP for hardware and infrastructure.

However, at time of publication it had not confirmed its participation. (See the Cambridge University Hospitals entry for more detail on its involvement with eHospital).

The trust plans to move from Papworth Everard, a village in rural Cambridgeshire, to a newly-built hospital adjacent to Cambridge’s Addenbrookes site. However, again at time of publication, the government had yet to approve funding for this – and the trust is does not plan to confirm participation in eHospital before its future location is confirmed. If it does move, it plans to start using eHospital systems well before shifting to Cambridge.

#### EPR status

Papworth’s systems are simpler than those of many trusts, as it has few departments because of its highly specialised nature. It uses an iPM PAS from CSC, which went live in May 2008, and which is linked to departmental systems. This includes Tomcat (Philips) in cardiology which, at one point, the trust considered developing as its all-purpose EPR.

It also uses specific systems for some rare diseases handled by Papworth. “There are no national applications for some of those diseases,” said head of IT and systems Michael Moore. The trust also provides information to national and international databases, another reason for specialist software. The trust does not have an overarching portal, but does use radiology, PACS, pathology and ward handover systems.

#### EPR plans

Papworth may join the eHospital programme being led by Cambridge University Hospital NHS Foundation Trust, but this will depend on a government decision about its future location. Pending a decision, it is continuing to develop its existing systems, starting with the introduction of electronic observations for vital signs.

If the government confirms PFI funding for the new Papworth Hospital, and funders are found swiftly, the trust would complete its move in 2017; it plans to take 33 months to build the hospital, and open it in the spring of 2018. However, the plans have suffered repeated delays in the past – the trust originally expected to move in 2010.

Papworth has 17 staff involved in the eHospital project, but has some differences of approach to Cambridge. While the larger trust is not intending to migrate any of its data into the new system, Papworth would want to do this. “There has to be some migration,” said Moore.

He added that his trust’s board is “not keen on the expense of HP”, which Cambridge plans to use as its connectivity and hardware provider. Moore also said: “If eHospital fails, it’s ‘dust down the old strategies’.”

The trust is continuing to develop its existing systems and was in the process of implementing order communications for pathology and radiology at the time of interview in April 2013.

It will start introducing electronic observations for vital signs in June 2013. All implementation work is currently carried out by trust staff. Moore said that none of its current suppliers “really excels”, although CSC/iPM and Tomcat do a reasonable job.
Papworth’s clinicians are keen to use their own devices, but Moore said he does not want to allow this to prevent infection of the network. He added that the current site has patchy wireless coverage given the age and configuration of its buildings.

**Use of paper**

Moore said the trust is “moving towards paper-lite,” and existing plans would achieve that, but he did not believe it would be possible to remove all paper.

**Costs and benefits**

Of the trust’s £1.95m IT budget, around £750,000 annually is capital expenditure. The trust’s board has accepted that spending is likely to rise due to cost pressures. If Papworth goes ahead with eHospital, it will spend around £40m over ten years. However, “if we can’t use HP at the old building, that cost could come down,” said Moore. “The board won’t consider it until the new hospital is decided.”

Moore said that cost savings are possible from the trust’s IT plans (both shorter-term and through eHospital), but added that experience suggested they may not materialise. Instead, “it contributes majorly to efficiency”; for example, shorter lengths of stay are produced through timely access to data.

However, much of the trust’s work is unpredictable - when a transplant organ is available, schedules must be changed to use it, making efficient scheduling tricky.
Royal Free London NHS Foundation Trust

Type of trust: General acute foundation trust

Route to EPR: Core EPR plus departmental systems

Rating of current suppliers: 2-3

Key supplier: Cerner

NHS Number usage: The local case note number is the primary identifier, as not every patient has an NHS Number, although nearly 100% do. However, the trust records the NHS Number as well and is aiming for full compliance.

Annual IT budget: £13.33m

Interviewee: William Smart, director of IM&T

Strategy
Royal Free London NHS Foundation Trust will make a new contract for provision of its core EPR software, held by Cerner, by spring 2014, ahead of the national contract negotiated through the National Programme for IT in the NHS running out. The trust may take over Barnet and Chase Farm Hospitals NHS Trust, and if it does this will require integration work. Royal Free also wants to extend its integration work with other London hospitals and local primary care.

EPR status
The trust uses Cerner’s Millennium suite as its core EPR software. This was procured through NPfIT and implemented in 2008. However, it has supplemented Millennium with departmental systems, for example for renal care and radiotherapy.

“An EPR is an aggregation of all the electronic sources of information we have about a patient,” said William Smart, the director of information systems and technology. In other words, it is not just Cerner Millennium, but a wide range of systems both inside and outside the trust. Royal Free has yet to implement electronic prescribing, or a system for intensive care.

EPR plans
Royal Free London uses Cerner Millennium, and must decide whether to retain it or find an alternative at the end of its national contract in 2015. It is looking to use Cerner’s Health Information Exchange to share information with GPs.

The trust will either choose a new supplier for its core EPR, or retain Cerner, through a London framework agreement tendered by a number of trusts by spring 2014, with the existing contract ending in 2015. “We are where we are,” said Smart. “It makes sense to build on where we are, rather than disaggregate.”

Royal Free is looking at using Cerner’s Health Information Exchange (HIE) to share information with GPs. It also has a document record scanning project underway. The trust does not use systems integrators for implementation, but its own team supplemented by staff from vendors and contractors.

The greatest challenge with EPR is execution and in keeping up with changes in the NHS, Smart said, adding that current suppliers could do more to help the trust execute projects. Keeping clinical staff engaged and enthusiastic over the long periods of time required in the development of new systems, is a further challenge, he added.

Use of paper
Royal Free is moving towards being paper-lite by digitising as much of its paper as possible – but does not intend to go paperless. “I think paper is just another device,” said Smart. “I don’t think we will ever lose it. In many processes, it’s a useful token.” It can also act as a useful input mechanism, as long as the data is captured. Smart added that it is becoming less important to put data into fields, given improvements in the analysis of unstructured data.

Costs and benefits
Smart said the trust’s £13.33m annual IT budget, which includes all spending, is likely to fall, although capital expenditure will remain stable and may even rise slightly, with support costs cut to allow this. The cost of the EPR reprocurement is not yet available, although the trust has prepared a business case.

The trust has five governing outcomes, including on patient outcomes and experience, and Smart said EPR is expected to improve these, as well as support its work as a teaching hospital through producing research data. Smart said EPR is starting to generate productivity benefits for clinicians, helping the trust to fulfil its strategy of moving to 24-hour seven day a week working, with its existing staff.
Royal Liverpool and Broadgreen University Hospitals NHS Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute trust</th>
<th>Current EPR status:</th>
<th>Live</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Best of breed with portal</td>
<td>Rating of current suppliers:</td>
<td>4 (“but we do have dips”)</td>
</tr>
<tr>
<td>Key suppliers:</td>
<td>Harris and EMC</td>
<td>NHS Number usage:</td>
<td>Used alongside the trust’s ‘RQ6’ number (RQ6 is the trust’s NHS code), with look-up on both as older records that do not have an NHS Number</td>
</tr>
<tr>
<td>Annual IT budget:</td>
<td>£8.69m</td>
<td>Interviewee:</td>
<td>James Norman, director of IM&amp;T</td>
</tr>
</tbody>
</table>

**Strategy**

Royal Liverpool and Broadgreen University Hospitals NHS Trust uses a portal to join up all its other systems. It is working on sharing data with local GPs and social services. It will be paper-lite when it moves to the new Royal Liverpool hospital, adjacent to its current site, in 2017.

**EPR status**

The trust has around 22 systems linked to its Harris CareFx portal. The wide-scale implementation of the portal followed a successful pilot two years ago, which used CareFx to link four systems. The trust then carried out an OJEU tender for a portal supplier, which Harris won.

The trust recently implemented an electronic clinical letters tool as part of its Documentum electronic document records management system, a project which started in September 2012 and went live in pilot form in April 2013. This covers all outpatient letters, including discharge summaries.

The trust’s model allows clinical data to remain in existing systems, with staff continuing to use them directly. Retaining existing systems allows for easier testing of integration and avoids having to retrain staff,” said James Norman, the trust’s director of IM&T, adding: “It’s also a lot more cost-effective.” However, the trust has introduced a single sign-on for all systems.

The trust has faced challenges linking into local GP systems. James said the main challenges had not been technical – most local GPs use Emis systems - but had arisen when GPs refused access. However, individual consultants can consult partial GP records, such as drugs prescribed since last check-up.

**EPR plans**

Royal Liverpool and Broadgreen is upgrading its portal and introducing a new decision support system. It wants to share data more widely, with other health and social care organisations, and then with the education sector.

The trust has no other internal systems it wants to integrate through its portal, but is upgrading the portal so it is compatible with Microsoft Windows 7 and 8, and to improve compatibility with Apple iPhones and iPads. It has also taken a new decision support system from Harris, and its chief clinical information officer Dr Mike Fisher has been working with the supplier on heart treatment pathways that will make use of this.

The trust tends to use some outside expertise for implementation work; for instance, EMC staff have assisted with the Documentum EDRM. However, when it does this it insists that knowledge is transferred to its own staff. “We don’t want to be tied in to an external contractor for the rest of the contract,” said Norman.

The trust’s main challenge in developing EPR systems is “managing expectations,” Norman said. “The technology is the easiest bit.”

He said his team works closely with staff and trades unions to make sure that those affected by changes to their working practices are engaged from the start. The implementation process for a new system can take 18 months, and it is important to continue engagement with staff, “particularly after 12 months when there are still no results”, he added.
Royal Liverpool is planning to give portal access to local GPs and is looking at sharing data with local social services. Norman said the NHS needs to integrate more widely, across primary, acute and ambulance services.

In future, the trust also wants to share data with schools and academia for research purposes; it is working with Liverpool John Moores University to set up a course on use of ‘big data’. This wider collaboration could take place through the local academic health science network, Liverpool Health Partners or groups of public sector chief executives.

Use of paper

Royal Liverpool and Broadgreen will be paper-lite on moving to its new hospital in 2017, and is already most of the way there, with the systems already in place to achieve this. “We will have no paper flowing with the patient, but paper flowing about the patient,” Norman said.

The trust still uses paper forms to transfer patients between departments, but will digitise these, and will stop clinicians sending letters on paper to other NHS or private healthcare providers. However, other organisations will continue to send the trust paper, and it will continue to need to print documents to send to other organisations and patients. Norman said he is only aware of one truly paperless healthcare provider, in Germany.

Costs and benefits

Norman said that he expects the trust’s £8.69m annual IT budget in 2012-13 to fall in the next two years, and he is seeking savings. On specific projects, EDRM has a £1.5m budget over five years, will have generated a return on this investment in its first 12 months and be into ‘profit’ by the end of the 2013-14 financial year.

The clinical benefits of the trust’s development of EPR are “massive”, Norman said, including instant access to patient details, diagnoses and treatments. It is rare for clinicians to have the time to search through multi-volume paper records, and data has been missed, he added.

Other advantages include availability of data on co-morbidities, other treatments, drug conflicts, allergic reactions and better security for the record – patients can no longer walk off with notes, for example.

The trust believes the portal saves clinicians 30-40 minutes per clinic, allowing them to see more patients or spend more time with those that they see. Removing administrative work also improves staff well-being, as clinicians are better-briefed on their patients and feel less stressed as they provide a better service.

Also, as the system can carry out real-time data validation, it has improved data quality, enabling clinicians to spot problems with treatment at an earlier stage.
## University Hospital Southampton NHS Foundation Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute foundation trust</th>
<th>Current EPR status:</th>
<th>Yes in part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Multi-vendor approach with portal functionality</td>
<td>Rating of current suppliers:</td>
<td>No rating (&quot;happy with some of it and not happy with some of it&quot;)</td>
</tr>
<tr>
<td>Key suppliers:</td>
<td>Ascribe, but with several other suppliers including JAC (for e-prescribing)</td>
<td>NHS Number usage:</td>
<td>Not the primary identifier, as the trust treats patients that do not have one (emergencies, patients from overseas, patients where a GP hasn’t supplied the number)</td>
</tr>
<tr>
<td>New systems annual budget:</td>
<td>£1.9m</td>
<td>Interviewee:</td>
<td>Adrian Byrne, IM&amp;T director</td>
</tr>
</tbody>
</table>

### Strategy

Adrian Byrne, the IM&T director of University Hospital Southampton NHS Foundation Trust, described its approach as “a multi-vendor approach with a clinical data repository, integration, single point of entry and a consistent user interface experience.”

He said that a single supplier approach risked committing the trust to one supplier or to having to change everything if it wanted to switch vendor. On the other hand, he said a collection of ‘best of breed’ software was difficult to integrate satisfactorily.

Southampton is taking a middle path, using multiple vendors, but focusing on a number of core systems, including a vendor neutral archive. In the next two years, it is looking to introduce electronic document management, acuity, intensive care, and more decision support systems.

### EPR status

The trust started building its EPR systems in-house in 1998, based on an Oracle database and Microsoft’s Internet Explorer browser. It has recently installed a new PAS, which provides the patient identifier and index.

It also has order communications in use across inpatients and outpatients, with the exception of radiology; electronic prescribing across all adult wards; and a searchable document management system that holds around 10m patient letters dating back to the mid-1990s.

Other systems include a doctor’s worklist, which allows for electronic handover between shifts - although this has yet to be fully implemented - pathology, radiology, theatre and maternity software, and PACS.

### EPR plans

Southampton is looking to build on the EPR development it has undertaken over the past 15 years, and has plans for an electronic document management system, decision support, and a bed management system that can be accessed from mobile devices.

The trust has a business case for an electronic document management system, and its IT strategy also includes plans to buy systems for high acuity, intensive care and decision support. The trust is also planning a bed management system that can be accessed from mobile devices.
Byrne expects cost to be the greatest challenge when it comes to implementing new systems, partly because the trust will need to invest in new devices to make the most of them. “Even if we bring in a bring your own device strategy, which we have, we will still need to put licences on those things and that’s incredibly expensive,” he said.

Integration will also present challenges. Byrne added that cultural problems can be avoided if IT delivers the right systems that work in a time-efficient fashion. “I think that culture hits you when you deliver a load of rubbish.”

Use of paper

Byrne said that the trust is “paper-lite in some areas and moving towards being paper-lite in more.” Its planned electronic document management system will move it further along this path.

However, he added that the trust has no current plans to go completely paperless. “I am not staying awake at night wondering how I am going to remove the last piece of paper from the organisation by 2018,” he said.

Costs and benefits

The trust’s IT budget was £7.5m in 2012-13, and Byrne said he expects it to remain stable. Benefits from the planned new systems should include reduced mortality (particularly from the acuity system) while document management should lead to better availability of notes and the closure of a library building.

Byrne added that electronic document management is likely to save money, but this may not be the case for all projects, and that others will be justified by improvements in quality.
University Hospitals Birmingham NHS Foundation Trust

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute foundation trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current EPR status:</td>
<td>Live</td>
</tr>
<tr>
<td>Route to EPR:</td>
<td>Clinical portal, drugs prescribing and observation system and departmental systems</td>
</tr>
<tr>
<td>Rating of current suppliers:</td>
<td>4 (self-supplied systems), 3 (commercial suppliers)</td>
</tr>
<tr>
<td>Key supplier:</td>
<td>In-house</td>
</tr>
<tr>
<td>NHS Number usage:</td>
<td>Primary identifier with approximately 95% usage, although some departmental systems have separate numbers</td>
</tr>
<tr>
<td>Annual IT budget:</td>
<td>£6.32m in 2010-11, declined slightly since</td>
</tr>
<tr>
<td>Interviewee:</td>
<td>Stephen Chilton, director of IT services</td>
</tr>
</tbody>
</table>

**Strategy**

University Hospitals Birmingham NHS Foundation Trust has been developing its EPR plans over the past four years, and already has significant functionality in place. This functionality is delivered largely, although not exclusively, from systems it has built itself.

“In some areas, we are already delivering work and activity that meets [the government’s] requirements,” said Stephen Chilton, director of IT services. He added that the trust has focused on making records and information available in support of its strategic aims, rather than on creating a unified system.

The trust moved to its new systems before opening the new Queen Elizabeth Hospital in phases in 2010-11. “We didn’t want a T5 event,” said Chilton, referring to the disastrous ‘big bang’ opening of the newest Heathrow airport terminal.

The new hospital has very good hardware and networking, with pervasive wireless supporting the use of 600 Motion tablet computers, as well as PCs and computers on wheels. This allows the trust to make more advanced use of IT in the new hospital than it could in services delivered in older buildings, which have poor wireless and hardware. Overall, University Hospitals Birmingham’s key systems are used by around 1,400 staff, accessing information on up to 5,000 patients, every day.

**EPR status**

University Hospitals Birmingham relies on two core systems, both built in-house: a clinical portal and a drugs prescribing and observation system. These link to departmental systems, which the trust has been cutting in number, but plans to retain.

University Hospitals Birmingham has built its two, core clinical systems - its clinical portal and its Prescribing Information and Communication System (PICS) - itself. The clinical portal acts as an electronic version of the patients’ case notes, pulling together information from specialist and departmental systems, some of which were bought commercially. It also includes lab and pathology results and discharge summaries.

PICS was built as an e-prescribing system, but has been extended to manage and record observations. For both activities, it applies information on the trust’s pathways and policies to advise staff on a course of action, and on medicines management.

This means “we can avoid poisoning our patients,” said Chilton. However, he stressed that PICS does not prevent staff taking a particular course of action; although it will query and then record any deviation from the usual rules.

Exceptions, and other data gathered by PICS, are used to monitor staff practice and the quality of treatment, consider changes to trust policies, and teach new doctors. The trust licences PICS commercially for use by other NHS organisations.

The trust has around 100 IT systems in total, down from 200 before a review around four years ago, and plans to reduce this to around 60. Chilton said that the trust is content that each specialty requires its own software, and that the trust expects to retain “a healthy number” of specialist systems.

However, in some cases individual clinicians within an area chose their own software, leading to multiple systems in one department. All surviving specialist and departmental systems will have to integrate with the clinical portal. An EPR board acts as a gatekeeper for these systems.
The trust has also built versions of its portal for GPs and for patients. The GP Practice Page provides access to trust records, including A&E information and discharge correspondence. When the page was launched, GPs had to pull data from it, but now it can push material into some primary care systems.

MyHealth, for patients, was first introduced for liver patients, such as those on dialysis. Chilton said the trust is extending its use to other patients with chronic conditions, particularly those that have to make many visits to the trust very short appointments, to pick up results or undergo quick checks. Many of these can be performed remotely, he argued.

**EPR plans**

Chilton said the trust considers a commercial procurement and in-house development for every new IT development. It has developed many of its key systems in-house because it could not find what it wanted commercially. “When we’ve built in-house, we have got a much more tailored fit,” Chilton said. “Solutions out there are too rigid. They don’t fit for us.”

Given its habitual use of in-house development and the commercialisation of several of the systems that it has built this way, the trust is unwilling to disclose detailed plans for the future. However, Chilton said that it will continue to focus on the part that EPR can play in delivering its overall objectives; treating patients safely, effectively, with dignity, and efficiently.

**Use of paper**

Chilton described the trust as “paper-lite”. Although paper forms are still used for inpatients, in its outpatient departments it has removed almost all paper.

When services transferred to the new Queen Elizabeth Hospital, some 30 reception desks were replaced by just two. To support this, it introduced self-service check-in terminals, which it built itself, makes available commercially, and are now in use at other trusts, including Royal Free London.

When patients arrive for an appointment, the information available to consultants includes anything that was sent on paper by GPs, which is scanned using the trust’s self-built electronic handling referral application (EHRA).

However, patients still check-in at the terminals by scanning barcodes (or numbers) on printed letters. Asked if the trust will go paperless, Chilton said: “Where it is appropriate and safe to do so, yes. Where it’s not, no.” As well as letters to patients, some GPs insist on getting paper records, he added.

**Costs and benefits**

Chilton said the trust’s IT budget has fallen slightly since the last disclosed figure of £6.32m in 2010-11, but it is stable and the IT and information department has become more efficient. He added that the budget is sufficient for the trust’s IT needs.

He said that the trust has benefitted from EPR through reduced errors, both in drugs and observations, through better monitoring, and through improved education. It has also used its software to improve the patient pathway, making the trust more efficient by releasing staff time. This has been used to treat more patients, rather than to reduce staff numbers. “I don’t think our business cases are built around saving money,” he said.
**University Hospitals of Leicester NHS Trust**

<table>
<thead>
<tr>
<th>Type of trust:</th>
<th>General acute trust</th>
<th>Current EPR status:</th>
<th>Live in part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route to EPR:</td>
<td>Has appointed a service provider to advise on future strategy. Aspires to a single software supplier, but may use some other systems</td>
<td>Rating of current suppliers:</td>
<td>3</td>
</tr>
<tr>
<td>Key supplier:</td>
<td>IBM</td>
<td>NHS Number usage:</td>
<td>On 99% of records, but local trust numbers in use as well</td>
</tr>
<tr>
<td>EPR project budget:</td>
<td>Part of £60m digital hospital project</td>
<td>Interviewee:</td>
<td>John Clarke, chief information officer</td>
</tr>
</tbody>
</table>

### Strategy:

Leicester has just done a ‘digital hospital’ deal with IBM, which will support its ambition to move from a ‘best of breed’ to a ‘single supplier’ strategy (although the trust recognises that it will still need some specialist systems). It is looking to introduce a new, core EPR system in 2015, alongside document management and unified communications solutions.

University Hospitals of Leicester NHS Trust has a ‘digital hospital’ deal in place with IBM, which it appointed as its systems provider after a major procurement. IBM will manage the replacement of the trust’s IT by about 2016, and trust staff will transfer to the company.

Until now, the trust has been using a best of breed approach, with portals at a departmental level. Chief information officer John Clarke said this was expensive. In addition, it had encouraged the use of systems that were only ‘best of type’ for a very short period of time; and that might not be particularly good in absolute terms.

“Best of breed is a bit of an interesting term,” he said. “Best of a poor lot is still a poor system.” He argued the trust needed to do different to do better. “Am I satisfied that they could take us forward into the new world? No, because I wouldn’t be doing this if I thought that was the case.”

The replacement of the trust’s IT will include the introduction of a new, core EPR system in 2015, as well as an electronic document management system, and a unified communications solution.

Clarke argued that through these developments the trust will meet the government’s 2018 deadline for digitised information, both within the organisation and out into primary and community care. IBM and the trust are yet to select which software suppliers will be involved in the work.

### EPR status

“If you look at all of the elements that would probably make up an EPR, we’ve probably got them all in isolation,” said Clarke, who added that this means the trust has an EPR system live “in part.”

For example, the trust’s systems share demographics data, but are not fully integrated. Systems that are in use trust-wide, without being fully integrated, include PAS, PACS, order communications, results reporting, messaging to GPs, and e-prescribing.

### EPR plans

Clarke said that to realise its future plans the trust would prefer to use a single supplier of EPR software. “That’s our aspiration, because best of breed doesn’t work,” he said. “But we will end up, probably, with some compromising around the edges. In a large university teaching hospital, you sometimes end up needing something so specialist that no large vendor can give it to you.”

He added that it is IBM’s responsibility to deliver an EPR. “I’m only interested in outputs; I’m not interested in widgets.” The trust and IBM have been working to agree what software they will use and how they will implement it, and hoped to have completed this work by June 2013.

Leicester can go outside the contract, if it does not like what IBM offers, “but we wouldn’t sign up to a partnership if we didn’t think that they can deliver for us” Clarke said.

Clarke said he expected “culture” to be the greatest challenge in implementing new EPR by 2015. “Everything else is doable – technology and all that is not a problem.” He said the trust has a positive approach to change, and introduced
order communications across the whole trust in four weeks. However, the new EPR system will change the way doctors work significantly, and this will need to be tackled carefully.

Use of paper

The trust is currently “awash with paper,” Clarke said, with 2.1m medical records on site holding some 160m sheets of paper. One of the first digital hospital projects will procure an electronic document management system to “get rid of our paper as much as we can.”

However, Clarke dismissed the idea that the hospital will go completely paperless, as partner organisations – including nursing homes, social services and overseas hospitals – will continue to use paper. Instead, the aim is for a paperless clinical record.

Costs and benefits

The trust spent £10.9m on IT (not including printing and consumable costs) in 2012-13, and will see this increase as a result of the digital hospital deal.

However, Clarke said the increase in spending will be matched by savings, such as removing most of the costs of dealing with paper records. “We anticipate that the benefits that we will get out of it will more than meet our costs.”

Overall, the trust believes it could cut 5%-10% of organisational costs through the new system. “Experience tells me it is going to be very difficult,” Clarke added. “But if I can improve quality, productivity, patient experience and bring that in cost neutral I don’t see why anybody would be unhappy with that.”

A key benefit of having all information on the patient available in one place is that it will help staff, he added, leading to better patient care and experience, reduced lengths of stay, fewer adverse reactions from prescribing, and fewer duplicated tests and investigations.

In terms of productivity gains, the trust believes it will save some clinicians the 20 to 30 minutes a day that are currently spent logging-in to multiple systems and navigating around them.

The new system will also handle detailed scheduling for a patient’s entire pathway through treatment, rather than booking single events, with staff having to work out the process. “I could probably make an argument that a PAS is a very inefficient scheduling system that should have been put out to grass a long time ago, what we need is proper multi-resource scheduling,” Clarke said.

He added that the digital hospital programme would mean more clinicians and patients wanting to choose Leicester over rivals. “If I don’t have really good technology, and the choice is between me and Addenbrookes [Cambridge] or Oxford, and the technology is fantastic in those places, where are the really good clinicians going to want to go to?” he asks.

The new systems should also boost research, both by automating data collection and analysis, and by giving clinicians more time to make use of the information generated.