

The NHS Information Evolution



Introduction and background

In this paper we hope to open the eyes of everyone dealing with information in the health and care system. We aim to provoke some sideways thinking in the NHS¹ by showing that patient information that is buried deep in silos can be used in new and imaginative ways. It is a paper about moving away from the old way of doing things to a new modern way based on what the most successful Internet companies have achieved.

Information is a critical asset in healthcare – it is the lifeblood of the NHS. But somehow the way we capture, share and use information is at least a decade behind the rest of our wider economy and society that, as we will show, has taken advantage of the digital revolution that continues to unfold in front of our eyes.

It is not that we have turned a blind eye. We have discussed, strategised and implemented information technology to modernise the health service for at least 20 years, but we are going around in circles. The recent focus on patient centred care in the *Information Revolution* and with ‘no decision about me without me’ in *The Power of Information*, envision a system where information follows the patient and is available and consented to the right people who need it at the right time. The Paperless NHS focuses on how we implement the technology solutions that can deliver this. Intellect believes it can be done, as we recently outlined, but we need to do things differently to succeed².

Previous strategies and implementations have been predicated on using the architecture that is in place today - the siloed operational structures, systems and services that are designed and implemented in secure isolation, burying information in deep silos and unavailable to those on the outside. We will not make sufficient progress quick enough if we continue on this path.

What needs to be explored is what the architecture looks like that allows information to flow horizontally and follow the patient. We recommend that the ideas presented in this paper be explored with the objective of addressing three pressing challenges:

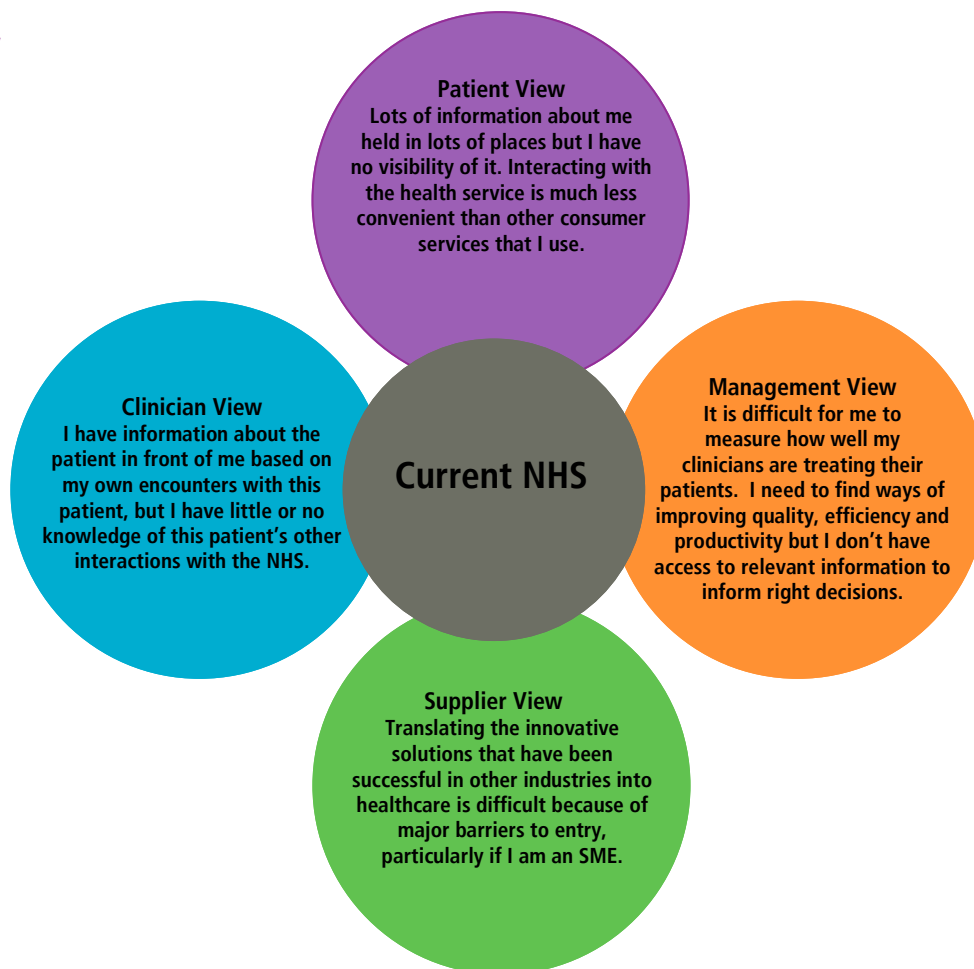
1. Creating an information architecture that will support the NHS and Social Care in achieving its efficiency improvement goals whilst improving the quality of care delivered to patients.
2. Giving real and sustainable quantum improvements to patients in terms of information sharing, information transparency, enhanced patient safety, patient choice and patient involvement.
3. Creating a level playing field for start-ups, SMEs and larger companies to innovate in an open, trusted environment that has a low barrier to entry with light-touch governance and standards. This is critical for innovation to flourish and for costs to be reduced across the NHS technology landscape.

Below we present the current state of where we are, where we want to go and how we can get there. We identify opportunities and challenges, make recommendations and call on everyone with a role, responsibility and interest in healthcare information to join us in developing the information architecture we need and deserve.

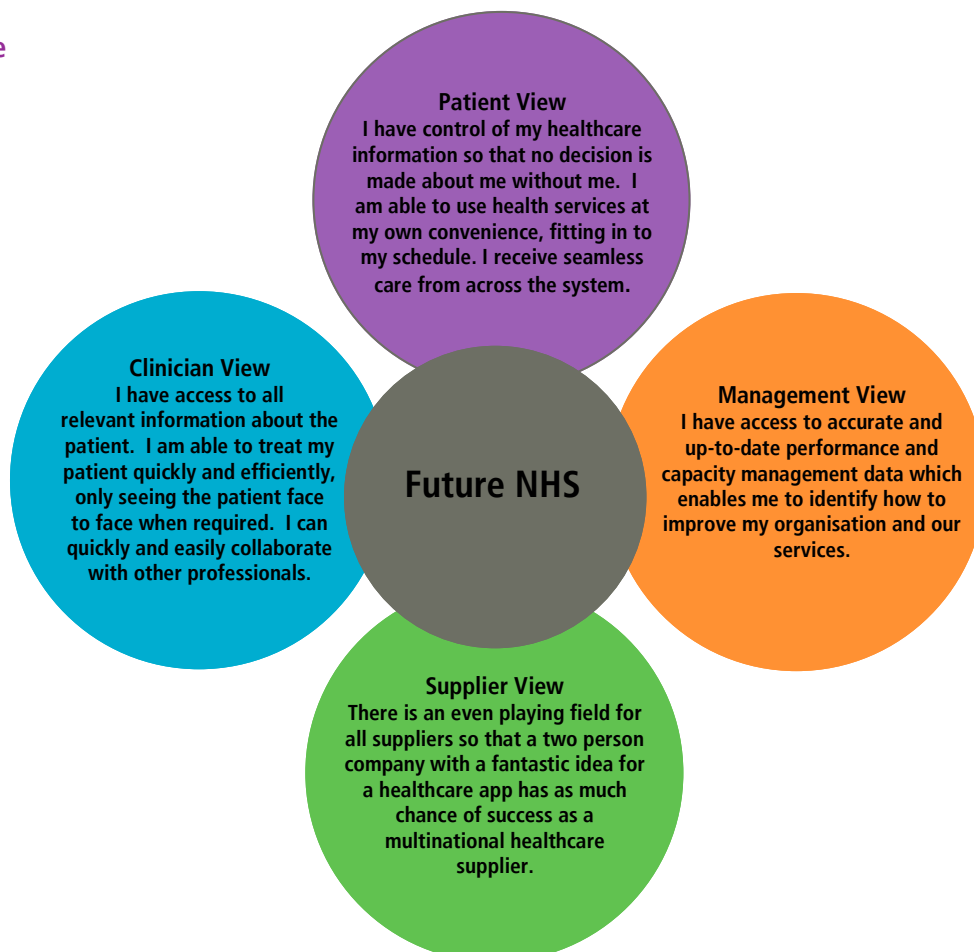
¹ When we say NHS in this paper we do mean (unless otherwise inferred) the entire health and care system, including the independent sector and social care.

² <http://www.intellectuk.org/publications/intellect-reports/9052>

Today



Future



Where are we now?

Our digital society

Every day we use online services for work and personally; in fact over 52 million of us in the UK access the Internet regularly³. And we are consuming more data on our phones and tablets than any other country⁴.

In the morning nearly 70%⁵ of us search for things to do and browse the latest news on our device. Over 14 million of us go on eBay⁶ to find the missing piece to our porcelain set. Then 50%⁷ of us go online to check our bank accounts to ensure we can afford our exciting eBay find. Over lunch 32 million of us log on to Facebook to chat with friends, look at pictures and check out various groups⁸.

Every month we book over 70 million trips using expedia.co.uk or a gig from lastminute.com⁹. NHS Choices get over 13 million visitors a month searching for health information¹⁰. In December 2012 we downloaded over 160 million apps¹¹. Worldwide over 100 million users upload over 1 billion files daily onto cloud storage and sharing site Dropbox¹².

It's no surprise that the UK is a tech-savvy and online-thirsty country; we are the cheapest place for consumers to exploit online channels¹³.

What makes this possible comes down to one thing, the Internet. The rise and accessibility of the Internet and its positively disruptive structure has allowed us to innovate and develop new services and communication channels we just didn't have only a few years ago. It is nothing short of a Digital Revolution.

Wouldn't it be great if the NHS could run its business and services in a similar way? There is a huge gulf between the ways we as consumers access Internet services to those that are available from the NHS. Wouldn't it be good if we could:

- get a lastminute.com style of appointment service to fill spare capacity across the NHS
- use an Amazon-like service to have care packages delivered anywhere they are required
- treat Choose & Book and e-referrals as in the same way as hotels.com
- learn from airline industry's online services to commoditise routine treatment and drive down costs
- use narrowcasting such as Twitter to broadcast non urgent messaging and Trust communications
- share experiences and create social healthcare support networks using services that have learnt from Facebook
- learn from Dropbox as to how easy it is to share information using cloud services

But the user community is already driving the revolution for online health services. Over 70% of us search for health information online¹⁴ and 30% have downloaded a health app¹⁵. Online access to records and transactional services are also on the rise. A recent Patient.co.uk survey found that over 90% of patients would take advantage of online health services if they were available.

3 http://www.ons.gov.uk/ons/dcp171778_286665.pdf

4 <http://media.ofcom.org.uk/2012/12/13/uk-a-nation-of-hi-tech-tv-lovers-3/>

5 http://www.ons.gov.uk/ons/dcp171778_301822.pdf

6 <http://pages.ebay.co.uk/aboutebay/thecompany/companyoverview.html>

7 <http://www.banksafeonline.org.uk/resources/did-you-know>

8 <http://www.fanalyzer.co.uk/demographics.html>

9 <http://www.advertising.expedia.com/en-gb/Pages/default.aspx> and http://www.lastminute.com/site/help/about_us/about-us.html

10 <http://www.nhs.uk/aboutNHSCchoices/professionals/developments/Documents/2012/performance-report-december-2012.pdf>

11 <http://xyo.net/app-downloads-reports/United%20Kingdom/09.01.2013/>

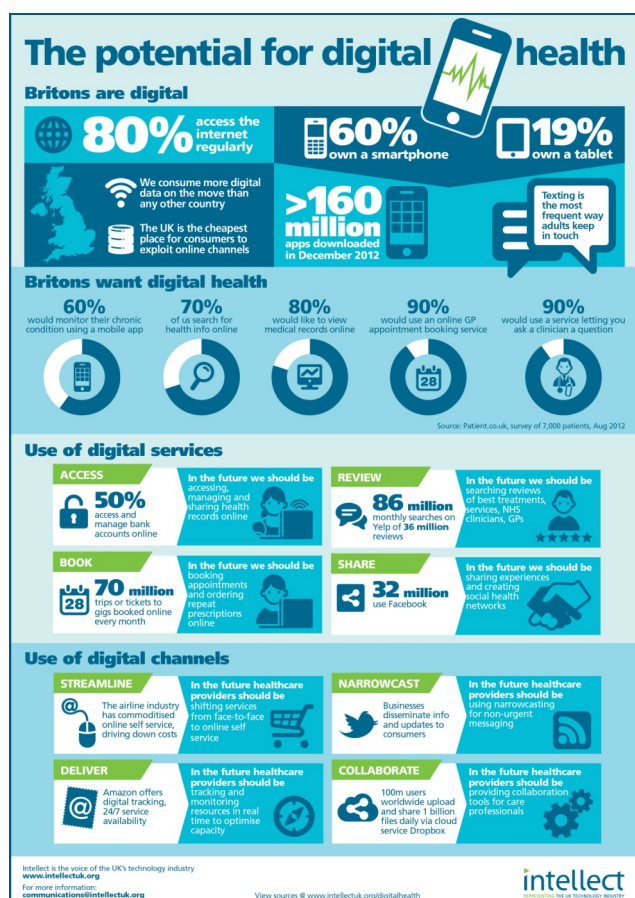
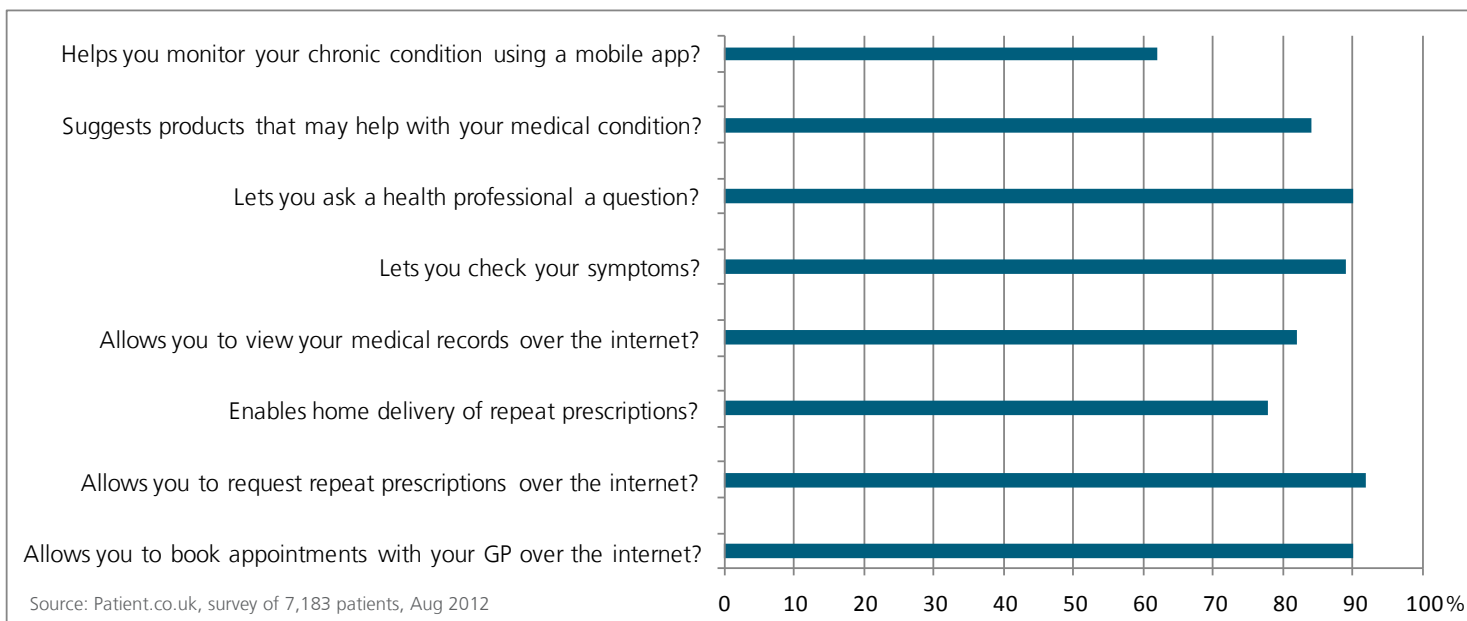
12 <https://www.dropbox.com/news/company-info>

13 <http://media.ofcom.org.uk/2012/12/13/uk-a-nation-of-hi-tech-tv-lovers-3/>

14 <http://www.bupa.com/about-us/information-centre/bupa-health-pulse/bupa-health-pulse-2010/health-wellbeing>

15 <http://hin.com/blog/2013/02/12/infographic-rising-popularity-of-mobile-health-apps/#.URtxV3tDotM.twitter>

Would you use a service that...?



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The NHS needs to respond to this growing trend and appetite, and to some extent it is. But in pockets and constrained by the old architecture.

However, change is needed to enable competition and innovation. We need to remove barriers to entry and in particular create the right environment to allow innovation to flourish by start-ups, small and large companies.

Current pressures on NHS information

More health and care services need to be digital and the NHS needs to make better use of information to “drive better health, care and support – to improve our experience, quality and outcomes of health and care services, putting people truly at the heart of care.” That is what *The Power of Information* strategy published last year by the Department of Health wants to achieve¹⁶.

This requires the NHS and other providers and stakeholders to start doing things differently. In particular it requires a different approach to the information technology architecture in place today. Today the health service operates in silos and, even more so, the information exists in deep silos that very few of the relevant people can access and make use of. It is no wonder that patients have to repeat their information multiple times when interacting with providers, or for GPs to wait for weeks for a discharge summary. Each department, surgery, hospital, Trust etc. operates on its own, in a deep vertical silo. Attempts are being made to reactively join-up pieces of information from these silos¹⁷, but they will remain in silos, hard to reach and locked-up for fear of breaching patient confidentiality.

Because the information is buried, the wider use of technology and digital solutions in the NHS are slow to scale. Patients can't access their records online with the information from all their providers. Care professionals can't have a holistic view of the patient and engage with all carers involved. Digitising straightforward transactions such as booking appointments, viewing test results and ordering prescriptions is more difficult than necessary. Innovative solutions such as the ones we enjoy in our social life still remain some distance away.

The technology industry believes there is an alternative approach to information technology in the health and care service. We believe that by metaphorically punching holes in the information silos we can have a horizontal, constantly flowing information system. Data and resources will become available in real time, providing an opportunity to make the system more effective. By making information searchable patients and professionals can access the right information at the right time. Opening up the National NHS Network (N3) to innovation from suppliers allows providers and patients to exploit digital services that are currently not available. Professionals can collaborate in real time no matter where they are located.

This is what can be achieved if we take an alternative approach to information technology in the NHS. It's not a new approach. It is something that the commercial world has done for years by taking advantage of the rapid growth and ubiquity of the Internet. As you will see below, the NHS is well positioned to take advantage of this opportunity.

¹⁶ http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_134205.pdf

¹⁷ Interoperability Toolkit initiative - <http://systems.hscic.gov.uk/interop>

Example: the national network that does not work for a digital NHS

The NHS provides national services over a communications network called the NHS National Network (N3). Today the NHS relies on the network to run services such as booking appointments, sending x-rays, prescriptions and summary care records.

However, the current service network is preventing the NHS moving ahead by being restrictive and slow to accommodate the changes we need.

The current service is not structured and managed to deliver the maximum potential:

- innovative digital services cannot be rapidly deployed and scaled across the NHS
- core services (e.g. Choose & Book) are closed to third-party add-on features
- information governance and accreditation is a blocker to innovation and sharing of information

The Network should be like the Internet - a catalyst for disruptive innovation of new, scalable services that benefit patients (e.g. access to records, transactions), professionals (e.g. collaboration tools), and health and care organisations (e.g. offer digital services to patients).

A modern NHS Network has the potential to achieve for the NHS in this decade what the Internet did for commerce in the last decade.

The status of the NHS Information Architecture

It would be difficult to claim that anyone has designed the NHS information enterprise that we have today. It has developed organically by meeting local needs first and the needs of the wider enterprise as an afterthought. It is characterised as a myriad of incompatible databases each needing to send information to other databases elsewhere in the healthcare system. This is the situation today in most hospitals where departmental systems have flourished because they meet the needs of the A&E department, the pathology department, maternity, or wherever specialist patient systems are required.

Step up a level and the same requirement to exchange information occurs between the providers of care; the hospital PAS/EPR systems, GP information systems, community systems, mental health, child health, social care, etc., all need to share patient information with each other as well as aggregated information with the Department of Health and other national agencies.

There has been one attempt to address this problem and that was the National Programme for IT. It was suggested that if the plethora of individual systems could be replaced by one or two standard systems then the problem of sharing information would no longer exist. But we didn't achieve this.

The next approach was to 'connect all'¹⁸ which meant that ad hoc links were created between any two NHS organisations in order to share patient information. But this is not a scalable solution. Initiatives such as the Interoperability Toolkit (ITK) will work on a small scale with a few connections, but does not provide the answer for the NHS enterprise.

So the situation at the start of 2013 is that we have plenty of systems that can deliver the Paperless NHS by 2018 – it could be achieved tomorrow if the budget existed. But it would lead to yet more isolated databases of patient information with little ability to share.

What is needed is a new model, an alternative way to think about patient data, and to borrow some of the concepts that have been successful in other markets.

18 NHS Operating Framework for 2010/11 <http://www.connectingforhealth.nhs.uk/systemsandservices/infoqov/links/operatingframework2010-2011.pdf>

Where do we want to be?

The Art of the Possible

Today we don't think twice about using email or instant messaging as a primary means of immediate, formal communication. When did you last send or receive a fax? When we want to book a holiday we use the Internet to book our flights and make hotel reservations. We store our electronic boarding card on our smartphone and refer to Kayak for the details of our trip and up-to-date flight information. We check the weather at our destination and load a movie or e-book onto our tablet to keep us entertained on the long flight. If we want our friends to see how much we are enjoying ourselves we post pictures taken with our smartphone on Flickr or Instagram. We search for highly recommended local restaurants on online sites and we stay in touch with world events via Twitter while waiting for our food to arrive. As we are paying the bill we book the nearest taxi using Hailo. To avoid costly international phone calls we use Skype at an open wi-fi hotspot to make a video call back to the office. This is the connected world we live in. It also demonstrates the diversity of applications that have been created as a result of an open and ubiquitous Internet. The pace of innovation is phenomenal.

Now let's look at the NHS.

What could the patient experience look like if the NHS adopted similar innovations?

The art of the possible: A future patient journey

// I have a heart condition and diabetes; I am 65 years old and can manage on my own. I have a few devices and sensors in my home to monitor my conditions and my day-to-day activities. I have an intuitive app that tracks my exercise and diet and a device that checks my blood pressure and oxygen levels. Today I receive an alert from one of these devices on my smartphone telling me that the latest readings indicate that I should contact my GP. I click on the link in the alert which triggers a secure chat session with my GP's practice nurse. The nurse checks with my GP and we agree that I should be referred to a consultant.

I can book a consultant's appointment as easily as booking a flight or a hotel. My GP sends me an electronic referral 'ticket' (much like a boarding card) that I use to book an outpatient appointment of my choosing. I can seek other patients' opinions of the hospital consultant, not from the hospital website but from a trusted independent healthcare review – a 'Tripadvisor' for hospitals. My work commitment is not too high at present so I volunteer to go on a "standby" list to be called at short notice if there is a cancellation.

I manage my own health record online and I can give consent to healthcare providers of my choosing to access the parts of my record that are relevant, and exclude those parts I want to keep private.

My GP gets an alert to say that my appointment has been made and that the consultant wishes to speak with my GP first. My GP clicks on the Skype link and is immediately connected to the consultant. They discuss my case, jointly review my online record, and decide to conference me in to discuss one particular issue. I join the conference call during which they explain to me the initial diagnosis and provide me with links to NICE guidelines for best practice treatment; I agree to some additional diagnostic tests before my outpatient appointment.

I consult my Health Services app (similar to Yelp) to locate the nearest pathology lab, checking first their average waiting time before booking an appointment with the press of a button. My blood is taken and as soon as the test results are available I get an alert from the My Health app on my smartphone that informs me that everything is normal. It advises me that my cholesterol level is a little too high so I should watch my diet. Hmm.

The appointment with the consultant is automatically added to my electronic diary but I receive a message saying that there has been a cancellation tomorrow so I immediately confirm that I will attend. At 6am on day of my appointment I get a reminder not to eat any breakfast. I access the Health Transport app to book a pickup and see that a hospital bus is nearby so I request a lift to the hospital.

After my appointment, the consultant updates my health record and gives me the all clear, with the comment that the exercise information in my health record generated by my running app indicates that I could perhaps work a bit harder on my fitness. I later revoke the access given to the consultant but let my GP continue to refer to the full record details for future reference.

To finish, I give my consultant four stars on the rating website, and five stars for the hospital's integrated patient transport system. Finally I make the results of the investigations open but anonymised for anyone that wishes to refer to this data.

Next day I start my diet.



Example: Collaboration for professionals

The NHS has always, and will continue to be a collaborative organisation. Historically this collaboration has been based on information being captured and shared in documents such as charts and letters. These were then attached onto emails as a means of sharing, a quicker way of sharing, but not optimal and dynamic.

What the NHS needs is an integrated collaboration platform that includes secure document storage and sharing, email, instant messaging, social collaboration, groupware such as tasks, calendars and contacts – not as an added option but as an integrated platform.

Critically, in this approach all documents would be stored in a cloud-based secure repository of the collaboration platform, rather than as attachments to emails or on local storage. Using such a platform allows documents to be accessed using a variety of devices securely based on access permissions. Sharing documents in this way reduces repeated storage of the same document, saving money. This paradigm has been embraced on the internet by vendors such as Dropbox and is used extensively in the legal industry, and has enabled new forms of intra- and inter-organisational collaboration. What's stopping the NHS?

Example: The goal to establish "One Singaporean, one medical record"

The Singapore story started in 2008 by defining the one medical record for their diverse population of 5 million citizens. The goal was to:

- Provide a longitudinal summary health care profile
- Provide a consolidated view of a patient's current problems and medications
- Share critical patient information across all providers in the patient's clinical care journey
- Provide patient information, accessible at the point of care to support clinical decision-making.

In 2011 the first phase was deployed, providing a single medical record for all citizens. GPs experienced the first benefits by being able to receive information about their patients' visits to hospitals and making the information available in the hospital. The initial deployment took only 11 months from the start of the programme to the implementation of the first phase. Early, incremental delivery success ensured clinical users remained enthusiastic about the programme and were not waiting years for the visibility of tangible clinical benefits.

Architecturally they built on existing systems and infrastructure wherever possible, not a 'rip and replace' approach, allowing services to continue without interruption and also ensure the protection of earlier investments. They created a 'data honeycomb' concept whereby data can be shared across organisations but what is shared can be reduced or increased dependent on the location of the organisation or the role of the user. This allowed the sharing of a lot of the data locally but reduce that data set the further away the health organisation may be, with the option to 'break the seal' if clinical need justified greater information access.

How do we get there?

Architectural choices

The current NHS information architecture consists of individual healthcare organisations exchanging information with national services, such as the Patient Demographic Service, Choose & Book, the Secondary Use Service, etc. This is characterised as a hub and spoke approach shown in Figure 1. It is centralist and supports a hierarchical organisational structure with information flowing to and from the centre.

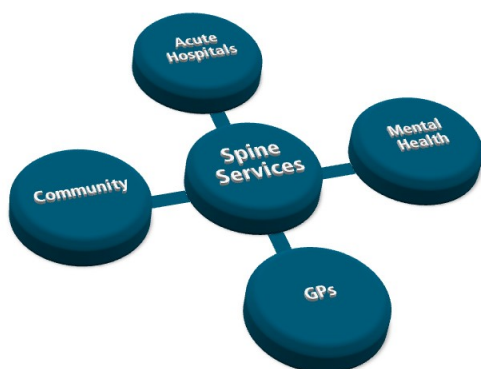


Figure 1 : The current hub and spoke model for centralised services

This does not lend itself very well to supporting patient pathways as very little information flows across the healthcare economy. When it does, it is pushed as discrete packets of information for the receiving system to interpret. Examples of this include referral and discharge letters, the electronic transfer of prescriptions, and pathology investigation messaging. This can be seen in Figure 2.



Figure 2 : The current ad-hoc 'push' model for cross-organisation messaging

These dysfunctional architectural approaches lead to:

- Inconsistencies in the technical implementation
- Information that is organisation-centric and not patient-centric
- High risk due to the dependency on centralised services
- Scalability problems for identity management (staff and patients)
- Inflexibility that does not reflect the regionalisation of healthcare services
- An NHS-only architecture – no social care or independent sector
- Difficulties for patients to access their own health records or other information necessary to support 'no decision about me without me'

But there is a better way.

Example: Information bus in the insurance industry

The Power of Information has recognised the importance of information sharing across the NHS as a key driver to future quality and efficiency improvements, benefiting patients and providers alike. Information bus approaches can be suitable to achieve this vision at scale, in incremental steps, maintaining information governance and above all be flexible and encouraging to new services and models of care we have not even thought of yet.

At a simplistic level an Information bus is just a bus route on which you place pieces of information. At various stations along the route the contents of the information can be examined and acted upon. Information can hop from one route to another at these places. The information remains on the circular bus route until a policy dictates that it is stored, removed, archived or destroyed.

For example the Health and Social Care Information Centre would gather information it needs to pay hospitals by results from the Information bus, rather than dealing with the monthly reports that it receives from the Trusts and processes in batches. It also opens up the possibility of patient-oriented services that allow patients to see information about their own care; this information could be stored in the patient's own self-controlled health record, or could be used in value-added services that the patient subscribes to. The permissions to see information flowing about them could be passed from one person to another in the case of a formal carer or allow the patient to set up transitory health professional networks to get a wider opinion on their diagnosis.

The Insurance Industry

Not so long ago you would go to a high street broker for your insurance. Their job was to assess your needs and make a phone call to the company that they recommended for you. They would take your money, complete the paperwork and receive a commission for their trouble. When computers came along a broker had to maintain computer interfaces with each of the different insurance companies they chose to work with.

An industry group, called Polaris, was formed to set up standards for describing the data that an insurance company would require from a broker before giving a quote. One interface design worked for all insurance companies. An IT industry was built around providing broker systems which fitted the standard and modifying the insurer systems to be able to serve up quotes.

Over time these brokers went online and new comparison services are now available. Business models are no longer commission-based but volume-based. The brokers retain, anonymise and use information to help clients choose between insurers. They also use this information to re-quote at renewal time.

This change in models required an Information bus that decoupled the insurance company and the broker as well as a set of interoperability standards that came from Polaris. The IT suppliers for the insurance companies and the brokers are all different. Even Polaris has changed their IT supplier over the course of the past 10 years.

What are the Characteristics of a New NHS Architecture?

There are other well-established architectural models that support and promote the types of innovation we covered in earlier sections. The current models outlined above are inflexible and don't readily support the types of applications that will transform the NHS. Some of the characteristics that will be needed in a new architecture for the NHS include:

- **Patient oriented** – NHS information needs to meet the needs of patients first, and NHS organisations second. This requires a consumer-focused approach to the architectural model. Patients should be able to manage their own health records, participate in care decisions, review care plans, and communicate easily with their care providers.
- **Federated** – to bring faster and more appropriate access to local information as well as greater robustness of essential services. The majority of healthcare and other associated services are delivered to patients within the geographic location of their home. A federated architecture would better provide for localised solutions.
- **Distributed** – to ensure that information is always in more than one place and not dependent on a single data centre. A decentralised or distributed model will simplify regional integration and reducing the barrier to entry for new systems. Regions could be based on GP populations, or commissioning groups.
- **Decentralised Identity Management** – to make it easier, quicker and more reliable to positively identify both staff and patients. The NHS depends upon accurately identifying patients and quickly authenticating their carers. Slow and cumbersome identity systems are circumvented, leading to increased risk. A decentralised common identity service, serving the needs of NHS staff and patients, will facilitate a faster response time and should apply proportionate controls to ensure patient safety.
- **Scalable** – to reflect the exponential growth and connectivity that will be required. A scalable architecture will permit the any-to-any connectivity required in a more connected NHS. It will not encumber organisational growth and diversity.
- **Flexible** – to enable NHS organisational structures to continue to develop dynamically. A new information architecture needs to separate the data from the functionality so that new ways of using or analysing the data can be created, and allowing systems to be more modular and reusable.
- **Searchable/Discoverable** – because you don't always know where relevant information can be found. Currently, the only person that knows where all of their health records are stored is the patient. If health record systems were to be made 'searchable' then patient information could be pulled together from across the NHS. As identifiable data, it would create a single virtual record. As anonymised episodic data it would prove invaluable for clinical research.
- **Observable/Subscribable** – to enable any events or activities to be monitored or generate a trigger. An architectural model that implement these characteristics will allow systems to indicate which patients are of interest and be informed of events relating to these patients. The success of Facebook and Twitter demonstrates that it is possible to implement publish/subscribe on a massive scale.
- **Mobile** – because tethered PCs will soon be a thing of the past. Mobile devices, smartphones and tablets are rapidly replacing desk-bound PCs as the preferred means to access information. Mobility should be seen as an enabler and not as a potential security threat. This rapid shift towards smartphones and tablets as the preferred device has to be embraced when developing a new architecture for the NHS.
- **Open** – to create an environment where innovation can occur. Adopting a more open approach would, for example, enable data repository providers to gather data and expose data via standard Application Programming Interfaces (APIs), and enabling application developers to build applications that leverage the value of this data using the exposed APIs.

Critical to the success of these architectural options is that they should be implemented in parallel with market mechanisms that incentivise procurers and suppliers to comply with these architectures.

Example: The Future of Choose and Book

Currently Choose and Book (CAB) enables PAS providers to share slots for booking by patients or their GPs for initial referrals.

Although rolling out CAB as a national solution is a significant and impressive achievement, the functionality available no longer meets business needs whereas the business need for acute providers to expose booking slots remain. The ease of this booking process could in fact become a source of competitive advantage for acute providers as they vie with each other for referrals from GPs in their region. This would mirror the emerging trend of acute providers opening up access to local GPs to enable them to track progress of their patients during acute episodes. This liberalisation would enable additional functionality to be deployed in response to market needs such as support for all referrals, and capacity management.

CAB has provided a good start by helping all stakeholders to understand the art of the possible. The alternative model of PAS providers and partners building booking functionality for their acute customers allows richer functionality and a much more direct link between product investment and the value delivered to the NHS as a whole.

If the existing service is to be retained then a number of simple changes could be made to dramatically increase its utility. For example a simple query interface could be exposed allowing applications to interact programmatically with the service in real-time, both for clinicians and patients. The service could in fact broker requests to the underlying PAS, enabling real-time status information. It could also provide better support for the referral and discharge document flows. Brokerage functionality could additionally be used to support service use by referral management centres. Finally the scope of the service could be extended to enable bookings other than initial referrals.

Summary and recommendations

The aim of this paper was to open the mind of the reader and to demonstrate that there are alternatives to the status quo. We recommend that the ideas presented here be explored with the objective of addressing three pressing challenges:

1. Creating an information architecture that will support the NHS and Social Care in achieving its efficiency improvement goals whilst improving the quality of care delivered to patients.
2. Giving real and sustainable quantum improvements to patients in terms of information sharing, information transparency, enhanced patient safety, patient choice and patient involvement.
3. Creating a level playing field for start-ups, SMEs and larger companies to innovate in an open, trusted environment that has a low barrier to entry with light-touch governance and standards. This is critical for innovation to flourish and for costs to be reduced across the NHS technology landscape.

In producing this document a number of key recommendations have emerged that are summarised below. The recommendations are not just aimed at the NHS; some are quite clearly for us, the supplier community, to take on-board working in partnership with the NHS. But all of the recommendations need to be considered in the context of a consensus that there is a pressing need to make radical changes to the way that information is used and flows within the NHS.

We urgently need innovation to occur in health and social care information services, following the example of the Internet businesses that have been created in recent years. **Recommendation 1 – our first recommendation is for the NHS to create a programme of work to develop a new information architecture for the NHS.**

Smartphones and tablets are becoming the devices of choice in the “post PC” era. The information architecture and associated networks and technical infrastructure need to recognise this and put ‘mobile’ before ‘fixed’ when designing network services of the future. **Recommendation 2 – think mobile first.**

The current way that patient information is shared involves ‘pushing’ data from one silo to another. This is inherently ineffective and leads to duplication and patient frustration. There are significant advantages of having the information more easily found. We envisage a future where an NHS search engine spider would interrogate systems for patient data / metadata. **Recommendation 3 – make all information systems searchable.**

There are benefits for establishing short-term ad hoc online collaborative workspaces to enable groups of carers to discuss a patient. In effect this is a multidisciplinary healthcare social network. **Recommendation 4 – facilitate doctor collaboration through a professional social network.**

Capacity management and the optimisation of resources across NHS Trusts are easily achievable. For example, Trusts could publish their slot availability in real-time in order to fill cancellations by offering “last-minute” slots to patients that are willing to be flexible on location or date. **Recommendation 5 – publish resource/administrative data in real-time.**

Information systems in the NHS need to be opened up to allow information to flow seamlessly between the silos. By ensuring open APIs are mandated in future procurements we can provide mechanisms for information systems to join up. Choose and Book, which is due for replacement, presents an ideal opportunity to create a platform on which value-added services can be delivered. It needs to have open APIs to enable third-parties to access the data and create a new market to improve the referral process. **Recommendation 6 – ensure that open APIs are part of information system procurements – starting with Choose and Book.**

The Digital Revolution has occurred partly because the Internet can be used by anyone for anything. New commercial ventures have flourished in this open market. The NHS network (N3) could also be opened up to create an environment where innovation is allowed to occur. **Recommendation 7 – open-up N3 to trusted suppliers to permit innovation to flourish and enable new services to be developed.**

The World Wide Web Consortium (W3C) is an international community that develops open standards to ensure the long-term growth of the Web. The NHS network needs an equivalent body in order to develop open standards and promote the long-term growth for the benefit of the NHS. It is not just a network; it needs to be seen as a set of core services and software applications. **Recommendation 8 – create a technology platform standards body (“W3C”) for the NHS.**

Accreditation is going to be a crucial aspect of more open NHS information services. **Recommendation 9 – implement [Intellect’s statement on accreditation](#) which recommends that self-accreditation should be the default.**

Thank you

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Intellect is the voice of the UK's technology industry.

We believe that a vibrant and successful technology sector is vital to the long term economic well-being of the country. Our business services help companies of all sizes compete and innovate in a dynamic global market. We represent the views of industry to government and regulators and also provide opportunities for government and regulators to interact with industry on key policy and market issues.

Our vision for the UK

To be the world leader in the development and use of technology for the benefit of its economy and citizens.

Our vision for Intellect

To be the go-to organisation for the technology industry in the UK that connects people, knowledge and know-how to solve problems, share understanding and cooperate responsibly for mutual benefit and the benefit of customers, citizens and the economy.

Our mission

Make the UK good for technology

Work to ensure that the UK is the best place in the world for technology companies (both domestic and foreign owned) to locate and grow.

Make technology good for UK

Work to ensure that the full economic potential of technology is harnessed right across the economy.

Make technology good for UK people

Work to ensure that technology is used to improve and enhance the quality of life of all consumers and citizens.

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