Cisco has had a dedicated Healthcare team offering guidance on Information and Communications Technology (ICT) solutions into the NHS since 1998, a thirteen year period that has seen significant changes in the UK Healthcare environment. Most recently, the Coalition Government signalled its intent to bring about one of the most transformational programmes the NHS has ever seen. Cisco believes that a significant enabler for the proposed reforms is the accelerated deployment of technology to offer business and service transformation.

Standards and best practice are very important to any organisation deploying technology-based solutions and throughout the last decade Cisco has issued many forms of guidance on ICT solutions for NHS organisations. Most significantly, in December 2008, the ‘Cisco Network Architecture Blueprint for NHS Trusts’ advocated an architectural approach that directly links ICT investment with business and clinical priorities. Given the extent of the Coalition Government’s plans for NHS reform, we have revised that guidance in the form of this updated blueprint, once again emphasising the value of an architectural approach.

We hope this blueprint informs your approach to ICT and demonstrates how technology can be embedded into your business planning. Cisco believes that the right ICT foundation can lead to improvements in business processes and service delivery. Please let us know if this is your experience, and if this Blueprint has helped your organisation.

Terry Espiner – UK Health Sector Manager
The challenges to NHS organisations have never been greater. Key amongst those challenges is the need to deliver increased efficiency and quality – to do more with less. ICT can no longer be viewed as a cost centre that reacts to events, but needs to demonstrate its value as a proactive and strategic partner, valued by the business.

Delivering rock solid stability needs investment, but without it, ICT will be less able to help deliver efficiency savings across the organisation. The business must have the confidence in its core systems and infrastructure if it is to innovate and grow.

The concept of ‘Commoditised IT’ that is being deployed at Great Ormond Street is one where the provision of IT infrastructure service seeks to be invisible. It is just there, works, and has a planned level of capacity that can scale with minimal effort. It also enables more to be delivered with less, precisely because it is an architected blueprint.

Central to this approach is the network. A strong, well architected and scalable network is essential. The Cisco Network Architecture Blueprint (C-NAB) offers a ‘no single point of failure’ solution that, at Great Ormond Street, has delivered in excess of 99.999% availability. It also provides a feature-rich platform that enables us to transform the delivery of services, the way we locate assets and the way we communicate.

Those seeking a rock solid platform should read on.

Mark Large – ICT Director, Great Ormond Street Hospital for Children NHS Trust
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Important Notice
*The guidance provided in this report is of a generic nature and cannot be specific to your organisation or operations. Please contact your Cisco partner or Account Manager to discuss your specific requirements. The guidance is provided in good faith based upon reference materials sourced from the NHS, Department of Health and other Healthcare organisations up to the date of publication. Errors and omissions are excepted: No warranty is given or implied.*
1. Executive Summary

1.1 Introduction and Purpose

The last 18 months have, without doubt, been a challenging time for NHS organisations. Tasked with addressing the Coalition Government’s reform and reconfiguration plans, meeting increasing demand and continually improving the patient centric care that the service offers, are all set against a backdrop of austerity measures. With challenge comes opportunity and Cisco believes there has never been a better time to step back and assess how ICT can play a much broader, integral and influential role in each of these areas.

The intention of this blueprint is to offer insight into how business-led NHS ICT can play an integral role in delivering greater productivity whilst also supporting new channels of care. At its heart this blueprint advocates an architectural approach, demonstrating alignment between business priorities and the ICT environment.

The blueprint consists of two documents as follows:

Volume 1: Business Requirements (this document)

• Questions how ICT can become an enabler of change.
• Takes a broader look at trends in healthcare and how a strategic approach is needed to meet ever rising demand.
• Considers the UK priorities at an organisation level and maps ICT solutions that can bring tangible value.

Volume 2: Technical Requirements (the companion document)

• Details the architectural approach and introduces a conceptual reference model that establishes the link between business and clinical priorities with the ICT environment.
• Introduces logical architectures or ‘solution sets’ and shows how they help to address the business and clinical priorities.
• Provides reference technical architectures that may be used by NHS ICT departments as a template for design in their own organisations.

1.2 How Does ICT Become an Enabler?

The priorities facing NHS organisations today may be categorised into three main areas:

• Operational excellence and efficiency;
• Reform and re-configuration;
• Patient-centric care.

Cisco believes that it is the perfect time for NHS ICT to raise its profile, demonstrating how it can return value against the priorities identified above and a two dimensional effort is needed:

• There must be recognition at an Executive Board level of the potential of ICT, and a willingness to embrace that potential;
• It is incumbent on ICT leaders to emphasise and justify the potential of ICT, and educate or influence Board members accordingly.

We recommend an architectural approach to demonstrate the direct linkage between the business priorities and ICT. This means beginning with an understanding of the business need, the applications that support that need, and the infrastructure that underpins it. Having established the strategy, an infrastructure should be deployed to support the applications that in turn support the business priorities. We term this approach ‘Plan Down, Build Up’.
1.3 Connected Health

It is important to take a much broader perspective when considering emerging trends in healthcare and how they may impact an organisation locally. Consideration should be given to the following four key themes:

- Delivering Health, Care and Wellbeing – the changing models of health and care delivery and the business capabilities required;
- Creating collaborative, information driven processes – cutting through complex and sometimes chaotic processes with information driven solutions;
- Providing access to information & training – servicing the ever growing demands for knowledge with collaboration tools;
- Supporting patients with access to information & records – considering areas such as co-production, choice and quality.

Developing a Connected Health approach, whether at local, regional or national levels, means that a number of business capabilities are required – business capabilities that each organisation must possess. This is where the journey begins and subsequently on which ICT investments must deliver.

1.4 Responding to the Challenge with Strategic ICT

Having understood some of the emerging trends, these must be included in any business-led ICT strategy. They should be considered in conjunction with the three NHS priority categories identified previously. Building on these categories we can begin to align ICT solutions that respond directly to business need.

Operational Excellence

- The efficient workforce – location-independence enabled by collaboration and mobility tools;
- The efficient workplace – estates rationalisation and flexible working policies;
- Energy and resources – meeting compliance and saving money through ICT enabled energy management solutions;
- ICT and shared services – efficient ICT products/solutions and sharing infrastructure and services where viable.

Reform and reconfiguration

- Networked solutions to bring organisations together;
- Collaboration platforms to allow disparate entities to work closely together in a secure environment;
- Integrated information and availability of information using a standards based approach offering a patient-centric view;
- Differentiated service delivery.

Patient-centric care

- Video and collaboration tools that scale the reach of outbound delivery of care;
- Productivity applications that positively impact on the patient experience;
- Timely delivery of care by making information available at the point of need;
- Health promotion and patient outreach solutions.
2. Introduction and Purpose

The last 18 months have, without doubt, been a challenging time for NHS organisations. Tasked with addressing the Coalition Government’s reform and reconfiguration plans, meeting increasing demand and continually improving the patient-centric care that the service offers, are all set against a backdrop of austerity measures.

With challenge comes opportunity and Cisco believes there has never been a better time to step back and assess how ICT can play a much broader, integral and influential role in each of these areas. Addressing any one of these challenges is a broad and complex undertaking, taking them all together determines the need for a different approach, one that involves solutions that can support more than one area on its own. Informed and proper investment in ICT solutions can do just this, adopting a strategy of building once and encouraging re-use optimises resources and maximises effectiveness.

There are many examples of best practice in the NHS where ICT has been seen and used as a strategic enabler. However, there are also examples where ICT is still treated as an operational cost centre, with perhaps even a belief that it can never deliver true value to the business.

The intention of this blueprint is to change that thinking and offer insight into how business-led NHS ICT can play an integral role in delivering greater productivity whilst also supporting new channels of care. At its heart this blueprint advocates an architectural approach to NHS ICT in an attempt to raise its profile to business leaders. Starting with an assessment of business and clinical objectives leads to an understanding of how the ICT environment should support those objectives. In this way NHS organisations can recognise technology as an integral part of their business, in turn delivering tangible and measurable value (see Figure 2.1).
The blueprint consists of two documents as follows:

**Volume 1: Business Requirements (this document)**

- Questions how ICT can become an enabler of change.
- Takes a broader look at trends in healthcare and how a strategic approach is needed to meet ever rising demand.
- Considers the UK priorities at an organisation level and maps ICT solutions that can bring tangible value.

**Volume 2: Technical Requirements (the companion document)**

- Details the architectural approach and introduces a conceptual reference model that establishes the link between business and clinical priorities with the ICT environment.
- Introduces logical architectures or ‘solution sets’ and shows how they help to address the business and clinical priorities.
- Provides reference technical architectures that may be used by NHS ICT departments as a template for design in their own organisations.

With productivity, re-configuration and patient-centric care as the key drivers, there has never been a more opportune time to re-think strategies, placing ICT at the heart of the business of the NHS – creating truly Connected Health.
3. Setting the Scene

3.1 A Time of Change

The Conservative/Liberal Democrat Coalition assumed power in May 2010 and immediately set about the number one priority of reducing the budget deficit. The June Budget, followed by the November Comprehensive Spending Review (CSR), detailed the full extent of cost savings that must be made by Public Sector organisations.

Cisco’s response is detailed in a paper entitled ‘Operational Efficiency in the Public Sector – 10 Ways to Cut Costs in 2011-12’. The paper notes that the traditional approach would have looked purely to reduce ICT costs, even though ICT accounts for just 3% of a typical Public Sector budget (often lower in the NHS). By contrast, treating ICT as a key business enabler could generate substantial savings in the other 97% of the budget.

The NHS has an established programme against which these savings can be made. Quality, Innovation, Productivity and Prevention (QIPP) aims to save £20bn, intended to be re-invested to address the ever increasing demand for health and care services. We believe that ICT should be integral to QIPP plans, producing efficiencies in the ‘other 97%’ as described above, but also contributing to improved patient outcomes.

However, the NHS challenge is not limited to productivity and efficiency. The Government’s proposals to reform the NHS include wholesale changes to the Commissioning landscape and significant implications for Providers. Following a period of consultation in mid-2011 and beyond, the final picture will see shifts in responsibilities and the formation of a new NHS organisational structure.

And finally, this climate of change is set against the overriding priority of the NHS – the delivery of patient-centric care. Included here are emerging challenges such as an increasingly ageing population, citizen or patient interaction, and the broader aspects of care and how collaboration between multiple care agencies must be supported. These are considered in more detail in section 4 of this document.

3.2 How Does ICT Become an Enabler?

Cisco believes that it is the perfect time for NHS ICT to raise its profile, demonstrating how it can return value against the challenges identified above. In order for this to be achieved, a two dimensional effort is needed:

- There must be recognition at an Executive Board level of the potential of ICT, and a willingness to embrace that potential.
- It is incumbent on ICT leaders to emphasise and justify the potential of ICT, and educate or influence Board members accordingly.

The challenge in some cases is removing the air gap between these parts of the organisation and to understand how to articulate the role that ICT can play.

1 Operational Efficiency in the Public Sector – 10 Ways to Cut Costs in 2011-12
Cisco’s approach to solving this problem is to show how business and clinical priorities can be clearly mapped to technology.

Figure 3.1 demonstrates this relationship in its simplest terms. This model consists of three layers:

- **Business Architecture** – the priorities and business functions of the organisation, currently and in the foreseeable future.
- **Application/Data Architecture** – the systems and interdependencies that will support the identified priorities.
- **Technical Architecture** – the underpinning and enabling infrastructure, that is built once to support all of the business priorities and ambitions.

Whilst this highlights the layers of consideration, it is most important to recognise a methodology for successful delivery.

Cisco believes that any ICT strategy has to begin at the top, with the current and foreseeable business and clinical priorities. Once these are well understood, a structured appraisal of application and system requirements can be made and subsequently a plan for infrastructure that matures with the business over the foreseeable period. We call this the ‘Plan’ phase.

Once the plan or strategy is in place, delivery must start from the bottom. It is critical to deploy the intelligent infrastructure first, so that it can support the defined application and systems requirements that in turn support the business priorities. This is the ‘Build’ phase.

To summarise, we call this a ‘Plan Down, Build Up’ approach. It is an approach that offers strict alignment between business and ICT, increasing the likelihood that the investments made will bring real value back to the organisation and that future plans are taken into account.
4. Connected Health - A Broader View

Before we can begin to map ICT solutions it is important to consider healthcare in a much broader perspective. Globally, healthcare’s use of information, knowledge and collaborative tools in the 21st century is evolving; it is no longer just about stand-alone “e–health” tools used at the point of care that generate data which is never shared. Instead, healthcare organisations are looking to a different approach where information technology is moving from the periphery of care delivery to its centre, where seamless information and knowledge become intrinsic to the planning and delivery of healthcare.

This ‘Connected Health’ approach supports co-operation across professional, organisational and financial boundaries, which in many health systems are becoming more frequently encountered by patients, and more complex as health and social care change, and in some cases merge. New tools are beginning to offer true connected health capabilities that combine best practice patient journeys, clinical evidence and public and private health knowledge. A connected health approach can help drive many other benefits:

- Remote care solutions: reducing lengths of stay and freeing up bed spaces for those who need them more - improving the reach of the NHS organisation whilst protecting or even improving revenue streams.
- Remote care solutions: improving the reach of the NHS organisation with the potential of alternative revenue streams.
- Joined up pathways across the whole patient journey, from wellbeing to acute episodes to social care.
- Faster access to specialists within the region, country or cross-borders, reducing waiting times and delays in decision-making.
- A better patient experience by delivering treatments more efficiently and in more convenient ways and locations.
- Supporting patient choice.
- Supports the growing emphasis on prevention – both of disease initially, and of acute crises for those suffering from long–term conditions.

In this section we concentrate on four key themes:

1. Delivering healthcare solutions;
2. Creating collaborative, information driven processes;
3. Providing access to information & training;
4. Supporting patients with access to information & records.

Developing a Connected Health approach, whether at local, regional or national levels, means that a number of business capabilities are required – business capabilities that each organisation must possess. This is where the journey begins and subsequently on which ICT investments must deliver.
4.1 Delivering healthcare solutions

Traditional models of health and social care will need to change as the world’s population ages, and simultaneously resources become more expensive and in shorter supply. Today, responsibilities for chronically ill people are split between local government, social care, family caregivers and healthcare organisations. At the boundaries of this infrastructure lie significant problems with continuity of care, funding, case management and governance.

Problems resulting from boundaries include those of a professional, organisational and geographic nature. They extend from ‘bed-blocking,’ caused by incoherent patient support plans between healthcare providers and social services, to financial hurdles that prevent payment for home care delivered by Telecare services because contracts do not allow for such practice. Therefore processes and communication within healthcare, and between healthcare and social care, need to become seamless, reliable and efficient for both the organisations and the patient.

Information and collaboration technologies can underpin processes that help to inform people about health risks, give advice on disease management, send reminders to mobile devices for doctor’s appointments and support prevention programs. However, for most healthcare organisations, these are not “natural” activities, as they involve building and maintaining relationships with people when they are not acutely ill. Social Care organisations have some regular, preventive interactions with their clientele, though not usually on the topics that are related to healthy living and disease management by the individual.

Of the factors that are driving healthcare providers to consider how, and where care should be delivered, one of the most pressing is the uneven distribution of medical expertise that must be addressed. Expertise is often located in larger cities whereas more rural areas lack the number and the variety of skills needed. Meanwhile, clinicians that are located in rural and remote areas can have times when they are not fully occupied, and their skills could be used in places where demand is heavier. Improvements in technology means some procedures could be offered in the surgeries of general practitioners or even the patient’s home, where in the past they had been confined to a hospital setting.

Another consideration is the worrying gap between the number of younger people required to care for the ageing and elderly, and those who will actually be available in the future. This demographic problem is a major concern in much of the developed world and places more emphasis on scalability of expertise and general support for those working in an informal caring capacity.

Finally, the advent of new Assisted Living technologies including Telehealth and Telecare solutions, for remote monitoring and care delivery, can be used to change the way in which patients are supervised and even manage their own care, especially those with Long Term Conditions.

The challenge therefore is to deliver a solution that supports integrated care, care at the point of need and pathways that are supported across organisational boundaries. The solution must offer an environment where collaboration and integrated information are underpinned by well defined governance.
The business capabilities required include:

- Building efficient relationships with a large population of potential patients and those living with long-term conditions;
- Flexible service delivery through social networking, mobile technology and collaborative environments;
- Recognising critical events through monitoring or patient interactions that require early, cohesive intervention from multiple professionals - potentially in a number of separate organisations;
- Secure information sharing and collaborative working across organisational boundaries;
- Finding equipment and resources by skill, location and as named individuals, across organisational boundaries;
- Offering flexible workstyles for social care and health care workers in each others’ facilities as well as remote and mobile working facilities;
- Offering multiple channels to the citizen, patient or carer that mean care or advice is accessed efficiently and with consistent quality.

4.2 Creating Collaborative, Information Driven Processes

Many industries have focused on process design and simplification as a way to improve productivity and quality. Healthcare is no exception and has some very tightly defined, regulated processes. However, delivering healthcare is full of complexity and a lack of process definition is to be expected at specific stages in the journey. Eliminating the sometimes chaotic, informal processes that form parts of healthcare and social care patient journeys can lead to improved productivity and quality.

There are some obvious examples in day to day routines such as identifying resources or assets efficiently; enabling remote workers to update information instantaneously; assigning tasks more efficiently based on location and skillset. Furthermore, underpinning these re-designed processes with the ability to track assignment, completion and other events allows governance to be added. In this way, processes can be introduced that use technology to recognise events, with escalation paths supported by information on which decisions can be taken.

In order to optimise processes and monitor performance, the following business capabilities are required:

- The ability to locate equipment, including status and availability;
- Locate people, including by skill set and individual or role;
- Assign tasks by skillset and location with positive acknowledgement;
- Collect event information as prompts for processes;
- Collect performance data for decision support;
- Deliver prompts and messages to add process governance and escalation in the event of process failure.

4.3 Providing Access to Information & Training

Medical knowledge is said to double at least every five years. This is an ongoing and significant challenge to health professionals in maintaining up to date understanding of treatments, procedures, equipment and quality issues. When combined with other pressures such as emerging technology and new organisational structures, the burden of learning is huge.

New collaborative technologies offer opportunities to capture and share knowledge in innovative ways that are part of the working processes rather than isolated learning events that are difficult to recall. For example, video has emerged as one of the fastest growing technology aids in a healthcare environment allowing in-person communications and learning to be scaled beyond traditional boundaries. When combined with web-based collaboration tools that allow information to be shared, the effect is to shrink the organisation and bring agility to the information sharing process.
Today's video and collaboration tools also support session recording such that those absent from any conference or training session are able to retrieve information as appropriate and at a time of their choosing. Meanwhile, new technological advances mean that challenges such as searching video or storing it contextually can also be addressed. Along with the increasing ubiquity of portable devices that can both capture and view video, the possibilities for more pervasive education and training are significant.

Other uses include educational and instructional video on demand from a centralised portal; ‘push video’ that supports health promotion in waiting areas or through internet portals and authoring software for developing interactive online-courses linked to a learning management system.

The business capabilities that healthcare and social care organisations require in order to capture the benefits offered by the new technology in the area of education include:

- Capturing information for health promotion and care at a distance;
- Similarly capturing clinical and social care expertise to share with other clinicians, carers and patients;
- Multi-media experiences for many different devices;
- Virtual classroom environments, to reach users in their places of work, at home, or even on the move as mobile workers;
- “On demand” content dissemination, built into the working processes of professionals to ensure they are always able to access knowledge.

Beyond simple patient access to records held in the health and care system, a number of additional factors are emerging that will place increased emphasis on the accessibility and accuracy of information on the care system that is available. These factors include:

- Co-production and moves to rebalance patients’ responsibilities for their health – informed decisions requires information on care options;
- Choice and new care delivery models that require much greater patient involvement in the care management process;
- Integrated care pathways, across health and social care, imply much greater transfer of information and communication between not only provider organisations and the professionals who deliver care, but also with patients, their families and carers.

Realising all of the above will require process management and information governance alongside efficient communications. New business capabilities required include:

- Data collection, storage and management facilities that can securely handle significantly larger quantities of information than has been experienced in the past – across an integrated patient journey involving multiple care providers;
- Providing secure access to records for patients, and other authorised non-professionals (family, carers);
- Communication and collaboration between relevant professionals, and with patients and their carers, to support choice, co-production, efficient delivery processes and rapid decision-making.

4.4 Patient Access to Information

By 2015, the European Commission is planning that all European citizens will have access to their electronic health records. This plan will clearly have wide-ranging implications for many healthcare systems, and the providers that deliver care. Although in some cases it is possible for patients to review their records now, the systematic right to do so will highlight the quality and content of such records. It will also mean that healthcare organisations must provide a secure, reliable means of patient access and accurate information.

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5. Responding to the Challenge

Section 4 has considered some of the broader challenges and emerging areas in healthcare and their potential impact. As they evolve to become organisational priorities, they should be included for consideration in any business-led ICT strategy. This section categorises the current UK NHS priorities that have emerged as a result, and subsequently begins to map ICT solutions to each area.

Note - In order to provide some current context, Appendix A contains a summary of NHS policy evolution over the last 18 months.

As described in section 3.1, Cisco has issued a paper on operational excellence in the Public Sector and how it aligns with some of the objectives of the NHS QIPP programme. It clearly shows that whilst ICT itself must contribute efficiencies, it should also be seen as an enable for cost savings elsewhere.

The NHS reforms and reconfiguration agenda sets different challenges. One of the most used phrases of recent years has been the need for ‘joined up healthcare’, something which has expanded to include social care and beyond. Conversely, it can also be argued that the NHS has become more federated in its composition. Despite the overarching NHS brand, autonomy offered by for example, the Foundation Trust programme has fostered an organisation that could be characterised as a collection of independent entities, often seeking competitive advantage. The challenge therefore is how to deliver connected health and social care in an increasingly fragmented market, a challenge that must be supported with ICT solutions.

Finally, patient demand is driving quality, choice and patient involvement. Increasing levels of competition in a regulated framework means that NHS organisations – in particular the providers of care – will need to seek differentiated ways of delivering their services. This will in turn open up new opportunities as the geographical boundaries of care are broken down.

Each of these categories can be underpinned by ICT based solutions that respond directly to business need:

- **Operational Excellence**
  - The efficient workforce – location-independence enabled by collaboration and mobility tools;
  - The efficient workplace – estates rationalisation and flexible working policies;
  - Energy and resources – meeting compliance and saving money through ICT enabled energy management solutions;
  - ICT and shared services – efficient ICT products/solutions and sharing infrastructure and services where viable.

- **Reform and reconfiguration**
  - Networked solutions to bring organisations together;
  - Collaboration platforms to allow disparate entities to work closely together in a secure environment;
  - Integrated information and availability of information using a standards based approach offering a patient-centric view;
  - Differentiated service delivery.

- **Patient-centric care**
  - Video and collaboration tools that scale the reach of outbound delivery of care;
  - Productivity applications that positively impact on the patient experience;
  - Timely delivery of care by making information available at the point of need;
  - Health promotion and patient outreach solutions.
5.1 Operational Excellence

Every NHS organisation is facing financial challenges set against ever increasing demands for care. The combination of these issues has accelerated the drive for operational excellence and efficiency. Here we consider the four main areas in which NHS organisations should consider productivity and efficiency.

5.1.1 The Efficient Workforce

Understanding the role of stakeholders in the workforce is essential to providing them with the right productivity tools and processes. Whilst there are clearly 24x7 requirements in a hospital environment there are many groups of healthcare workers who could perhaps fulfill their roles differently. It is therefore useful to consider stakeholder groups – for example office-based, home-based, day extender, mobile – and carefully analyse their business needs. Other situations such as time of day or location may create other demands. For example:

- Workforce projects such as the NHS Hospital at Night programme that require a different approach to workflow management;
- A community care worker may benefit from having instant access to information and expertise on the move, negating the need to return to the traditional workplace to update notes or arrange referrals;
- Ward efficiency could be improved through location tracking of assets such as IV pumps and wheelchairs, and staff such as porters.
- Multi-Disciplinary Teams could avoid travel and save time, supported by video and collaboration tools;
- Using technology to spread knowledge, e.g. delivering remote lectures by video conferencing technology both in the UK and abroad.

Assessing the needs of these stakeholder groups and situational requirements will identify the way in which collaboration and location-independence technologies can offer improved efficiencies. Each of these solution sets enable more flexible working resulting in agility and savings associated with time and travel.

5.1.2 The Efficient Workplace

Historically an organisation’s Estates strategy would be entirely separated from that of ICT. In today’s NHS there is an increasing relationship between the way that buildings are designed and managed and the way that ICT can be used to increase their efficiency.

Consideration should be given to shared infrastructure and buildings with other NHS organisations or even external agencies. A secured ICT environment can allow multiple agencies to co-exist with appropriate separation.

One challenge is likely to be the requirement for cultural change where staff may be asked to work in different ways. Location-independent workers should have access to information, applications and services on an ‘anytime-anywhere’ basis. No longer dependent on the traditional facilities of any physical building, they can adapt workstyles to suit personal preferences. The associated policies could for instance include home-working strategies or perhaps ‘hot-desking’ environments for transient workers.

The strategy could also include the use of collaboration and video to ensure that an optimum meeting experience is available between sites thereby reducing the need for travel and saving time.
5.1.3 Energy and Resources

Having an energy and resources strategy for your organisation is particularly important at this time because of the steep rise in the cost of natural resources and the advent of the Carbon Reduction Commitment (CRC) obligations – and potential penalties for non-compliance – set out in the Climate Change Act of 2008³. In the NHS, the Sustainable Development Unit ⁴ is an excellent source of information and advice in this area.

ICT can play a key role and the strategy should not only explain how to reduce the energy consumed directly by ICT infrastructure but also how it should be used to manage overall energy consumption. It should also highlight the cultural and process changes that are needed to reduce the consumption of energy and resources by individual workers.

Infrastructure based energy management solutions can ‘manage’ the energy consumption of network connected devices such as IP Phones, Wireless Access Points and desktop/laptop equipment. Energywise can also integrate with some Building Management Systems therefore offering a holistic view of the energy estate.

5.1.4 ICT and Shared Services

Many NHS organisations are examining how they can make efficiency savings by sharing infrastructure or services on several levels. One popular area of consideration is the concept of shared Data Centres within the NHS environment and the evolution towards a ‘Private Cloud’ model. Private Cloud allows organisations to retain control but gain the benefits such as agility and flexibility by pooling or sharing infrastructure, services and resources more efficiently. This approach could apply to a group of Trusts within a region, facilitating resilient, secure and shared Data Centre facilities across their organisations, thereby inherently introducing consolidation and shared cost savings such as:

- **Capital cost savings** from virtualised infrastructure that will deliver higher utilisation and reduced power and cooling requirements;
- **Operational cost savings** as Data Centres are consolidated and managed holistically;
- **Increased ICT staff productivity and business agility** through shared services, hosting, and ‘just-in-time’ provisioning.

Another area to consider is the lifecycle management of the ICT infrastructure itself. As equipment ages, inefficiencies present themselves as increased cost of operations as well as the increased risk of downtime. The first step may be a structured network review to highlight the true operational costs and make recommendations on where savings can be realised by eradicating duplicate, unused and out-of-date equipment.

At the desktop, many organisations have projects looking at the virtualised desktop environment (often referred to as VDI). Virtual desktop is the term used to describe a network-connected user device that communicates with a central, virtualised server for execution of software applications. The user operates the screen, keyboard and mouse of the virtual desktop device in the normal way, but the central server is responsible for executing the application. Virtualising the desktop optimises ICT operations and brings other efficiencies such as support for a standardised device pool.

Finally, aspects such as the ‘consumerisation’ of devices must be considered. Many organisations are faced with ever increasing demands from users about using their own personal devices in the NHS environment. The biggest concerns here are securing information both on the device and in transit. The options can be summarised as either: adopting total control using a standard device pool including business tablets such as those offered by Cisco; or an open policy on user devices with a focus on securing the device and data in transit. Each organisation should decide on an approach for their environment with usability and management being key considerations.

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⁴ NHS Sustainable Development Unit – http://www.sdu.nhs.uk/
5.2 Reform and Reconfiguration

The Government’s reforms have led to a significant reconfiguration of the NHS and its increasingly federated nature dictates that underpinning infrastructure is needed to enable communication and collaboration. The NHS is fortunate to have a national network (N3) that links all NHS organisations, connects to other Government agencies and provides gateways to the Internet. In many ways N3 is a prime example of an early ‘Private Cloud’ given some of the hosted services on offer.

Such services include N3 Voice and Video that enable organisations to benefit from toll free voice and new, innovative technologies but reduce the administrative overhead that is associated with them. Meanwhile Community of Interest Networks (COINs) have long been a feature, connecting regional NHS communities such that they can easily and securely share information and enjoy the potential of a joined up approach to service delivery across their region. These types of networks have been offered within N3 and by third party service providers.

Going forward the network offers the opportunity to increase the scope and breadth of collaborative working as well as opening up the NHS marketplace where services can be scaled beyond traditional boundaries. The PSN (Public Services Network) is evolving and could open up new opportunities for connectivity. Meanwhile, the next generation of infrastructure is widely expected to evolve towards the much publicised ‘Private Cloud’ model described in section 5.1.4. This will open up new models of service delivery with some organisations consuming services in a different way and some perhaps behaving as service providers to others. The network has clearly emerged as a critical, enabling business asset.

The impacts are widespread but there are two key questions that emerge:

- In the new Commissioning set up, how will Clinical Commissioning Groups consume services (including ICT) and how will they be supported?
- On the Provider side, how can organisations differentiate themselves in order to remain competitive against the backdrop of ‘Any Qualified Provider’?

5.2.1 Commissioning

As Clinical Commissioning Groups (CCGs) evolve they will be distributed in nature – potentially across broad geographies – and may in some cases suffer a lack of ICT expertise.

Whether based on the COIN model or evolving ‘Cloud’ services, the network provides the ideal platform to host voice, video and collaboration services that bring together all the constituent parts of a CCG regardless of geography. This approach offers stakeholders the ability to communicate face to face over high quality conferencing systems as well as sharing and exchanging information. Beyond connecting the internal organisation, connectivity is also possible to other elements of the NHS or through secure gateways to entities such as social care.

Where ICT expertise is lacking there will also be challenges associated with application support. Due to the nature of the networked environment, CCGs could choose to allow their applications to be hosted, for example, in a local NHS Trust or other N3 approved, connected provider. Advances in Data Centre technology allow today’s applications to be consolidated in to a central site without compromising on performance at the remote site. In addition security measures can be put in place to ensure the separation of data in the hosted Data Centre. This ‘as a service’ (xaaS) approach is consistent with global trends in networked ICT.

5 Any Qualified Provider - http://healthandcare.dh.gov.uk/any-qualified-provider
5.2.2 Provider

The principle short term challenge in the provider side of the NHS is the consolidation and integration of acquired or merged entities, creating a period of flux whilst the people and processes are assimilated or rationalised. At the same time many Providers are re-assessing the services they offer and considering rationalising and indeed specialising.

ICT can play a leading role in this consolidation effort. As organisations merge, they will need to standardise on systems and applications in order to achieve efficiency savings and improve processes. This presents a genuine opportunity to redefine care pathways and evolve to collaborative, integrated care.

Beyond this structural change, providers will need to address one of the fundamental objectives of NHS reform – the creation of a dynamic, competitive marketplace within a regulated framework. This in turn indicates a need for provider organisations to differentiate themselves. Offering quality, patient choice and ease of business transactions are just some of the metrics that provider organisations will be judged upon. ICT solutions can play a key role in enabling this differentiation by for example, extending reach and expertise, offering patient choice and an auditing capability that adds governance and triggers escalation paths.

5.3 Patient-centric Care

Patient centricity is a longstanding core principle of the NHS, however recent years have seen even more emphasis put on areas such as choice and quality.

ICT is playing an increasing role in the development of solutions that fundamentally change the way care is delivered. One of the most topical issues is the delivery of care closer to and in the home and is associated with a number of terms: Assisted Living, Telecare and Telehealth being just a few. In order to assess the potential it is useful to split the end to end delivery of these solutions in to three domains:

- The consumer of care, either in the home or other setting such as a Nursing Home;
- Supporting the caregiver with access to information and clinical expertise when working with patients remotely;
- The information store – an integrated, patient-centric view.

The combination of video and collaboration solutions supports the concept of virtual healthcare, whereby a patient is able to gain access to a defined list of healthcare resources from wherever they may be. Whilst the potential for scaling services to rural areas is obvious, this type of solution could also be used to support Prison Healthcare or perhaps into Nursing and Residential Homes. Apart from scalability, the respective fringe benefits could include costs associated with secure transport and reduced hospital admissions.

In ward environments, mobility and location tracking solutions can enable more time to be spent on delivering care as opposed to looking for assets or people. This can be further scaled with workflow optimisation tools that ensure jobs are allocated in the most optimal way, hence delivering more time for patient care.

Further to this, technology such as digital signage can be used to deliver powerful health promotion material to patients in waiting areas, supporting the drive for awareness on lifestyle issues or perhaps supporting campaigns such as blood donation.

These are just some of the examples of where ICT based solutions are making a tangible, measurable impact on the delivery of patient care.
6. The Service Delivery Platform

Cisco believes that all NHS Trusts should invest in a flexible and extensible end-to-end ICT infrastructure capable of meeting all today’s and potential future requirements. We term this the ‘service delivery platform’ and it should be regarded as a business-critical asset. It must support the solutions that address the three priorities of operational excellence, reform and patient centricity. It must also have the feature richness and flexibility to address foreseeable future needs.

The service delivery platform in healthcare comprises three principle solution sets:

- **The Borderless Network** – the enabling platform for secure, high performance delivery of applications, information and services to location-independent workers.
- **Data Centres** – consolidated, virtualised and potentially shared service delivery points that house all applications, information databases and converged services.
- **Collaboration** – a set of tools that includes multiple video applications to support care at a distance, health promotion as well as intra and inter-agency collaboration across broad geographies.

Figure 6.1 shows the ICT infrastructure dependencies of a remote care worker and illustrates the critical nature of an end to end, feature rich and scalable ICT platform to support better patient care.
In this scenario we illustrate a remote care worker using a tablet device to securely access information whilst treating a patient in either their home or another place of care.

- The device operates over a variety of mobile technologies and all data is secured in transit;
- The virtualised technology environment allows data to be viewed and input on the device, but for the data not to be resident on the device;
- Video support allows remote expertise to be available on demand and collaboration tools allow the remote care worker to share information with others in real time;
- Applications are consolidated either to the organisation or shared services Data Centre or indeed into the private cloud of N3 or approved, connected suppliers;
- Voice and video services may be either locally provisioned or offered through N3.

Underpinning all of this is the intelligent borderless network offering connectivity to anyone, anywhere, with any device, at any time and supporting inherent security features for information and service assurance. As organisations look to the advantages of sharing infrastructure and services across traditional boundaries, the COIN model can be stretched towards a ‘Private Cloud’ model as discussed previously.

For an alternative and practical example of the service delivery platform at work, we recommend reference to independent reports on innovative work carried out at Nottingham University Hospitals NHS Trust as examples of best practice uses of ICT. There are two reports produced by the Association of Certified Chartered Accountants:


Set against a backdrop of ‘Productive Ward’, this report details the financial, operational and patient benefits of deploying innovative technology in an Emergency Department. For example, waiting times in the Emergency Department were significantly reduced by deploying location technology to address a real business and clinical issue.


Set against the backdrop of ‘Hospital at Night’, this report shows how workflow management and enhanced communications using secure tablet devices is delivering significant financial benefits as well as operational efficiencies and better patient care.

Cisco provides much of the technology that underpins both solutions and we believe these independent reports demonstrate the value of investing in the ICT platform.

In summary, we recommend an architectural approach to the development of the service delivery platform. Such an approach allows an overall ICT ‘architectural blueprint’ to be developed and agreed by stakeholders, and then built incrementally as performance and functional requirements develop and budgets permit. This approach also enables the cost-effective re-use of existing systems as the building blocks for new services in what is referred to as service-oriented design.
7. Conclusion and Next Steps

This business document has set out the need for a strategic and architectural approach to ICT in the NHS and has:

- identified evolving healthcare trends;
- categorised priorities for NHS organisations and aligned ICT solutions;
- demonstrated how the underlying infrastructure can become the platform for success.

Critical to all of this is the ‘Plan Down, Build Up’ methodology described at the beginning of the document which Cisco advocates for any organisation wishing to align technology investments more closely to business priorities.

If you would like more information and to explore how such an approach could make a difference in your organisation, Cisco would be very pleased to discuss this with you. Please consult Appendix B for your local Cisco contact.

7.1 Part Two: The Technical Document

Part two of this blueprint takes this approach to another level of detail.

- It begins by introducing a conceptual architecture specifically for NHS organisations. It offers a representative view of the business and clinical priorities and maps them through the application environment towards the infrastructure layers.
- The document then goes on to discuss the service delivery platform in more detail, including logical architectures or solution sets that support the business and clinical priorities.
- It provides detailed, technical reference architectures for infrastructure design that can be used as a template for ICT delivery.
- It discusses emerging technologies and approaches that are challenging NHS organisations such as options for shared services, sustainability and ‘consumerisation’.

Please turn to the technical document for the detailed architectural model and guidance on how ICT can implement solutions that directly benefit the challenges and opportunities discussed in this document.
Appendix A. UK Healthcare Policy and Implications

The last 18 months have certainly been an interesting time for anyone associated with UK Healthcare. A change in Government brought about new ways of thinking, some of which have been challenged by professionals and observers inside and outside of the industry. In this section we attempt to summarise the output as it stands at the time of writing. The intention is not to ‘re-tell what is already known’ but to set the background to the positive impact that ICT can make in each identified area, as well as demonstrating Cisco’s appreciation of the marketplace.

A.1 Re-configuring the UK National Health Service

After coming to power in May 2010, the Coalition Government set out its intent to introduce stringent reforms in the NHS and a series of publications were forthcoming. Firstly, Equity and Excellence: Liberating the NHS set out the Government’s vision for healthcare in the UK. It detailed well publicised changes to the Commissioning framework with General Practitioners (GP’s) adopting a leading responsibility for commissioning, the rationale being that they as the front line of healthcare provision would best understand the needs of the local communities that they served. The announcement of new organisations such as GP Consortia groups and the NHS Commissioning Board signalled the end for Primary Care Trusts (PCTs) and Strategic Health Authorities due to be phased out over the coming years, both going through a period of consolidation as the transition was to be put in place.

Of less media interest but just as significant were the changes announced to the Provider marketplace. All NHS Trusts would be expected to achieve Foundation status by 2014 and if that wasn’t achieved they would likely be consumed by others through merger and acquisition activity or be managed by a separate entity. At the same time the concept of ‘Any Qualified Provider’ (formerly ‘Any Willing Provider’) grew in importance establishing a more competitive market that allowed Mental Health Trusts and Acute Trusts with Foundation status to grow their business, but at the same time opened doors for Local Authorities, Private Healthcare and Social Enterprises to play a role.

A series of response documents were issued including British Computer Society’s Preparing the NHS for an Information Revolution. This publication responds to the Government’s consultation paper Liberating the NHS: An Information Revolution and advocates ICT and information playing a key role in service transformation and offers insights as to how that may occur. Critically, it points out that such a planned transformation:

“...cannot be accomplished without using information and technology to reinvent both its internal operational functions and its outward facing business model.”

Later, in December 2010 the new NHS Operating Framework was issued and accompanied by a letter to all Chief Executives from Sir David Nicholson highlighting the short term focus on delivery and the QIPP programme. Notably, it also emphasised that informatics had a major role to play.

January 2011 saw the Health and Social Care Bill 2011 released, described as:

“a crucial part of the Government’s vision to modernise the NHS so that it is built around patients, led by health professionals and focused on delivering world-class healthcare outcomes.”

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7 Preparing the NHS for an Information Revolution - http://www.bcs.org/content/contWebDoc/39814
The Bill brought together the proposals contained within ‘Equity and Excellence: Liberating the NHS’ and other publications as well as findings from various consultations. After much publicity and growing challenges from various organisations, the Government announced a listening exercise in April 2011 in which the ‘NHS Future Forum’ would consider all viewpoints and ultimately issue a report in June 2011 that recommended 16 principle recommendations for change to the Health and Social Care Bill including:

- The pace of change should relate to the readiness for change.
- Nurses, specialist doctors and other clinicians should be involved in commissioning decisions.
- Competition should be used to improve quality, promote integration and protect citizen rights.

The report prompted a re-think on policy including the abandonment of the deadlines associated with Commissioning groups and Foundation Trusts, and a new organisational structure emerged that encompassed the proposed changes.

At the time of writing a further round of consultations was underway and a new emphasis on integrated care was introduced. However, despite any further changes that may subsequently unfold, what hasn’t changed is the significant breadth of reform involving all aspects of healthcare delivery, which may be summarised in two key objectives:

- To liberate the NHS from centralised management.
- To create a dynamic marketplace offering choice, transparency and competition in a regulated framework of quality and performance.

A.2 Quality, Innovation, Productivity and Prevention (QIPP)

QIPP is one of the most important programmes in today’s NHS. The programme was introduced under the previous Government, however more tangibility has been introduced regarding the efficiencies that need to be made. The Coalition have taken QIPP from being an aspirational programme to one that is directly linked with £20bn of savings that must be made by April 2015 in order to meet increased demand in a time of austerity. Broadly speaking this equates to around 4% year on year savings.

However, QIPP is not just about delivering savings, a series of workstreams and their leads have been established, each focussed on delivering their share of the efficiency savings whilst also improving patient outcomes where possible.

Cisco believes that ICT is a critical component to achieving success in each of the QIPP categories.

- Quality: scaling of expertise to increase service delivery capability. Improving accuracy of information.
- Innovation: enabling new ways of working to provide flexibility for both staff and patients. In turn this will allow better utilisation of time and reduce demand on human resources.
- Productivity: deliver operational excellence and efficiencies through collaboration and integration tools.
- Prevention: for example, enabling health promotion through the use of digital media and ensuring high quality access to medical education.

A.3 Commissioning Re-configuration

One of the most debated aspects of the Health and Social Care Bill has been the constitution of Commissioning groups. The original plans for the establishment of GP Consortia have been changed in favour of new Clinical Commissioning Groups (CCG’s), the principle differences being that CCG’s will have nomenclature that describes the community or locale that they represent, must not cross Local Authority boundaries and that they will include clinicians and/or nurses, though not from any local provider organisation. The CCG’s will be responsible to the NHS Commissioning Board that will provide commissioning support where CCG’s are not ready and provide guidance on how to apply choice and competition. In June 2011 it was also announced that the existing Primary Care Trust clusters would be retained as local arms of the NHS Commissioning Board.
A new form of organisation was also introduced in June 2011 known as Clinical Senates. The intention is for Senates to produce advice to CCG’s and their constitution will include representation from Social Care and Public Health, strengthening the link between the NHS organisation and its Local Authority.

As authorisation roadmaps for CCG’s are established and groups are re-organised to meet the new requirements, what is clear are the challenges that will exist in terms of the constitution of these organisations. Whether it’s CCG’s or Senates, or even regional arms of the Commissioning Board, they will be challenged by geography. Cisco’s belief is that a collaboration strategy for each organisation is essential such that these organisations can work effectively and be as agile as possible – all supported through ICT.

**A.4 The New Provider Marketplace**

The healthcare provider market in the UK is very broad and the Health and Social Care Bill sets out an ambition to make this broader still creating a dynamic, competitive marketplace.

It is widely accepted that the community setting is where 90% of patient contact with NHS organisations occurs and this has been a key focus, further developing the ambitions of Autonomous Provider Organisations of recent years. The Transforming Community Services programme, originally established in 2009, set out to separate the Provider arms of Primary Care Trusts. In practice this saw Community services transferring to Acute or Mental Health Trusts, newly formed Integrated Care Organisations, Community Foundation Trusts, Social Enterprises and in some cases independent sector entities with a deadline of April 2011. Whilst these changes were fairly rapid in nature, many were conscious that tangible benefits had to be delivered. For example, in its Briefing of November 2010 “Transfer and Transform”\(^\text{11}\), the Primary Care Trust Network (NHS Confederation) said:

“Transferring services without the accompanying transformation, even if not immediately, is a waste of time, effort and resources.”

One transformational aspect of community services is the delivery of care closer to, and in, the home. Whilst a multitude of pilots have taken place over the last five years, it is apparent that the patient benefits and efficiency savings have perhaps not been what they could have – in some way due to these efforts taking place in a relative time of plenty. With today’s austerity measures having a harder financial impact, it is anticipated that Assisted Living solutions – focussed on care, well-being and social participation – will make faster headway.

Many provider organisations are now looking at consolidation of services to improve operational efficiency and re-investment into services that differentiate the organisation. These may be specialist services that a Trust offers with new ways of delivery such as the use of video and collaboration tools to break down traditional service boundaries.

Perhaps the most challenging aspect for partners and suppliers alike is the variety in the constitution of many new organisations. Local priorities have seen services shift between organisations and a mix of mergers and acquisitions between Acute, primary care and mental health provider organisations as well as the move of elements such as Public Health outside of the NHS altogether. It is Cisco’s belief that ICT can simplify these complexities by offering a robust and secure collaborative platform that allows organisations to work effectively regardless of geography and specialisation.

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11 Transfer and Transform - [http://www.nhsconfed.org/Publications/briefings/Pages/Transfer-and-transform.aspx](http://www.nhsconfed.org/Publications/briefings/Pages/Transfer-and-transform.aspx)
A.5 The Importance of Partnering

There has always been a need for partnering in the NHS, but today it is even more critical. The drive for integrated care and information means that organisations must collaborate more effectively both within the NHS but also externally. New organisations such as Clinical Commissioning Groups and Clinical Senates means that communications and collaboration capabilities will be essential to avoid the negative implications of travel – namely cost, time and carbon. Other drivers such as the increasing blend of health and social care will mean collaboration, internal to the NHS as well as external, will be an advantage with the correct governance in place. Such partners include:

- Integrated Care Organisations
- Ambulance Services
- Academic Health Science Centres
- Research and Education
- Social Care

Effective information sharing across organisations will be key to delivering joined up services and can be seen as a journey for organisations as follows:

1. **Sharing** information – for instance using collaboration tools to allow multiple, organisationally and geographically disparate attendees to view shared information.
2. **Exchanging** information – secure transfer of information from one location or organisation to another.
3. **Integrating** information – representing a single, consistent, consolidated and integrated patient-centric view across all organisations.

The platform for collaboration will vary accordingly. For simple sharing of information, hosted collaboration platforms such as Cisco’s Webex can prove to be an agile solution for shared content and conferencing across a wide geography. Governance is critical to ensure that the information being shared is suitable for a hosted platform. Alternative, more localised, secure options are available.

Exchange of information is well known through secure message exchange or other such mechanisms, while integrated information requires a solution that can consolidate outputs from multiple applications and offer a patient-centric view.

Underpinning all of these solutions is the network platform. From simple hosted solutions over the Internet (where applicable) to the established Community of Interest Network (COIN), the emerging Public Services Network or other strategic approaches to shared NHS infrastructure and ‘Private Cloud’, each organisation will base its decision on value and need. Policy is evolving and we can expect more to be revealed in the Information Strategy and subsequent Technology Strategy due for release in the Autumn of 2011.
# Appendix B. Reviewer List and Contacts

## Reviewer List

<table>
<thead>
<tr>
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## Cisco C-NAB Team (Business Document)

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## UK Healthcare Primary Contacts

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Cisco Network Architecture Blueprint (C-NAB) for NHS Organisations