Digital Technology at the Heart of the NHS

Healthcare and IT – Better Together

Contents

1. Introduction and Purpose: Healthcare and IT – Better Together

The last ten years have seen significant growth in the global healthcare IT market. Innovative approaches to the delivery of health and care seem to emerge daily, while the use of technology to improve efficiency and workflow in healthcare environments is widespread.

Technology and the positive impacts it can bring are now more widely recognised by Governments as well. The UK Government's 'Digital Challenge'[1] has a bold aim to make the NHS 'paperless' by 2018, which it believes will improve service delivery, make substantial savings and help meet the health and care needs of an ageing population.

Funding arrangements have also been put in place. In 2013, the Secretary of State for Healthcare announced a £260m technology fund under the banner of 'Safer Hospitals, Safer Wards'. The fund was so oversubscribed that the amount pledged by the Government was raised to £500m on the condition that all bids were match funded by health and social care organisations, realising a total fund of £1Bn to be invested in three years[2].

Soon to follow was the Government's announcement of a £100m Nursing Technology Fund[3], while other initiatives such as NHS Wales' own £25m Health Technologies Fund[4] announced in January 2013, demonstrate the increasing relevance of technology in the delivery of health and care. Elsewhere, NHS Scotland's eHealth funding is distributed through the Health Boards rather than being controlled centrally – in the belief that funding for eHealth is closer aligned to patients and professionals.

Whilst all of these initiatives are of course welcome, funding is just one piece of a significant puzzle. The other aspect that must be considered is the way that technology impacts business processes. As solutions are planned, what positive – and potentially negative – impacts will they have on service delivery and operational efficiency? A thorough understanding of business and clinical requirements is essential to ensure that IT solutions deliver a meaningful return on investment.

In this document we take such an approach by presenting examples from a journey through the healthcare system. Focusing on elements of both service delivery and operational efficiency, we show where information and communications technology can, or does deliver benefit. Its purpose is to advise business and clinical decision makers on the potential of IT where a firm business case is established, and to support this assertion, many of the highlighted use cases have real life examples where solutions have been deployed to meaningful effect. The scope of the document extends throughout the patient journey, inside and outside of hospital.

Each element can of course be considered individually, addressing challenges and opportunities as they arise. However, the document goes on to demonstrate that to make all these things possible, it is the underlying collaboration platform and enabling infrastructure that are the common denominators of success.

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1 The Digital Challenge - http://digitalchallenge.dh.gov.uk/
2 £1Billion for Health IT - http://www.ehi.co.uk/news/EHI/8869/hunt-announces-%C2%A31-billion-for-health-it
3 Nursing Technology Fund - http://www.england.nhs.uk/ourwork/tsd/sst/nursing-technology-fund/
4 NHS Wales Health Technologies Fund - http://www.wales.nhs.uk/news/25574

2. Opportunities and Solutions: Twelve Use cases

It is clear that in any organisation, IT investment should be driven by the business requirements and the capabilities needed to deliver upon them. Healthcare is no different. Whether the focus is on internal operations and workflow, or service delivery to the patient, it is essential to understand the opportunities that can be supported by technology.

In this section we present a summary of twelve separate use cases, demonstrating where benefits are tightly aligned to the IT solution that has been either put in place, or where there is potential to be unlocked. It is not the intention of this document to enter technical detail but simply highlight the possibilities offered.

For each use case, the identified solutions are enabled by a **mobility and collaboration platform** – one that can be re-exploited and that offers greater benefits as it grows. The selection of use cases is not exhaustive. We do not include all aspects of the health and care continuum in this document and are aware of some notable exceptions such as Ambulance Services and Social Care. However, each use case should promote creative thinking, where the same solutions could be applied elsewhere, and throughout the patient journey.

2.1 The GP Consultation

Many people's first interaction with the healthcare system is through a consultation with their General Practitioner (GP), often leading to a specialist referral of some description. There are several reasons for this, i.e. the need for further investigation to aid diagnosis, to specific treatment required or more generally for reassurance purposes.

Referrals are a very important part of a GP's role and a Kings Fund report in 2011 estimated that 1 in 20 GP consultations result in referrals needing to be made[5]. Prior to this, back in 2010, in a paper looking at GP referral and diagnosis, the Kings Fund put forward a number of recommendations[6]. Amongst these was a need for improved communications with other practitioners:

"Mechanisms and incentives for improving communication between GPs and specialists should be explored. Good clinical relationships facilitate information exchange, provide learning opportunities and underpin high-quality diagnosis and referral. Good relationships may also make it easier for GPs to seek informal advice, reducing the need for making formal referrals and avoiding duplication of tests."

5 Kings Fund: Improving the Quality of Care in General Practice -
   http://www.kingsfund.org.uk/sites/files/kf/field/field_related_document/gp-inquiry-report-evolving-role-nature-2mar11.pdf
6 The Kings Fund: The Quality of GP Diagnosis and Referral -
   http://www.kingsfund.org.uk/sites/files/kf/field/field_document/quality-gp-diagnosis-referral-gq-inquiry-research-paper-mar11.pdf

The implication therefore, is that if GPs were armed with better information and decision support tools, unnecessary referrals could be avoided.

There are a number of ways in which communications technology can address the need for better decision support. An integrated communications system across the health economy would allow easy reach of any specialist decision support at the time of referral. With an integrated solution, users can access resources they need from an extensive directory of contacts. These contacts are able to demonstrate their availability whether they are working on site, at home or when mobile.

In addition, if video technology is provided as an integral part of the solution, then it allows for face to face communication, perhaps extending the consultation to three parties, i.e. the GP, the patient and the specialist. This would allow for a much more informed decision making process – potentially mitigating the need for referral – with the added benefit of providing extra reassurance to the patient.

Figure 2.1.1 demonstrates the flexibility of today's video-based solutions for decision support, with a range of interoperable endpoints to suit most use cases.

Decision Support
Ad hoc GP consultations

Cisco Jabber keeps remote clinicians visually connected by enabling TelePresence on any laptop, PC or Mac, or iPad

Business Value ⟶ · Faster responses and consultation by visually connecting remote clinicians to patients, specialists and administrators via TelePresence video on any laptop, PC or mac, iPad and other devices.

· Potential for better care at point-of-care with speciality consultation

Figure 2.1.1 Decision Support: Ad hoc GP Consults

2.2 Accident and Emergency Department

Many NHS Accident and Emergency Departments (A&E) are faced with forecasts of increasing demand where the department is already stretched to capacity. Indeed, during 2013 and 2014 to date, there have been regular news events around various A&E 'crises' across the UK.

Often problems within the department are exacerbated by the size or complexity of the environment or simply the pressures associated with high demand. Enabling people to locate resources such as medical equipment allowing them to communicate seamlessly is a significant contributor to the operational efficiency within A&E. This functionality can help minimise lost time associated with trying to locate assets such as wheelchairs or medical equipment, and supports real time communication with colleagues no matter where they may be.

A case study published by the Association of Chartered Certified Accountants (ACCA)[7] looks at how Nottingham University Hospitals NHS Trust (NUH) used communication and collaboration technologies to improve workflow within their A&E department.

"The report provides a persuasive account of the huge impact the new communications infrastructure deployed at NUH has had on re-engineering the day-to-day working processes of its emergency department. The report highlights the role of communications tools in creating a more efficient, streamlined and peaceful working environment in which NUH can deliver high quality care to care to patients."

In the time that has passed since the publication of the report at NUH, technology and its capabilities have advanced. While desk and wireless phone technology still plays a critical role in delivering operational efficiency, we now see deployments where tablet devices are used to provide richer access to information. In addition, smart phones can be used and seamlessly integrated into the hospital communications environment. These devices can be either provided by the NHS organisation or personally owned and connected using the increasingly popular 'Bring Your Own Device' (BYOD) solutions.

Real time location services is another technology that can introduce efficiencies in A&E departments and the wider organisation. It is commonplace for hospital staff to spend time trying to locate equipment or assets used to deliver patient care. Solutions based on location services can offer real efficiencies in this regard, while integration into the communication environment would allow key support staff such as porters to be contacted on the move.

Underpinning all of these solutions is the collaboration platform. Wired and wireless networks, Unified Communications, Location Services and the devices themselves all work together to deliver productivity benefits to health and care workers resulting in time savings that can be returned to patient care.

2.3 On the Ward

Every NHS ward is a busy environment. Multiple clinical disciplines, nursing staff and support workers make up the total care package that patients receive. In order to deliver the co-ordinated care that is needed, excellent communications is a critical tool.

Traditionally, wards have been designed around a nurses' station which would hold one or more communal PCs and desk telephones. Meanwhile bleep systems were used to notify people when their expertise was needed. Though it undoubtedly worked, this well established system is fraught with inefficiencies:

- Clinical staff have to continually re-visit the nurses' station to access information causing wasted time during patient rounds;
- Repeated or alternate logons are needed for different systems;
- The number of people around the nurses' station can mean delays in accessing information;
- No context or determination of priority when the same 'bleep' alert is used for all events (barring crash calls).

It's clear therefore that the concentration of activity in this area can cause frustration and delays.

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7 Collaboration and Communications Technology at the Heart of Hospital Transformation – http://www2.accaglobal.com/documents/CCT.pdf

Today's wards are changing. The introduction of new unified communications systems means that desk phones, wireless phones, tablets and even employees' own devices can be securely integrated into one communications system and with access to the information and resources that they need. Equipped with mobile devices, clinical and support staff can access information on the move and more importantly at the point of care. Where the devices support telephony, they can for example, call for decision support, and be contactable themselves.

The benefits are profound. Increased administrative work can be carried out at the point of care, while communications devices allow everybody to be contactable (when appropriate), and conversely, to be aware of the availability of others.

Extensions to the communications environment supports the integration of other processes. Location Services, as described in section 2.2, enables the identification of important assets and resources, while collaboration tools allow for instantaneous conferencing sessions that support the sharing of information from one to many. Use cases here include ad hoc Multidisciplinary Team (MDT) meetings, or Bed Management meetings, thereby negating the need for participants to travel to a meeting room on regular occasions throughout the day.

Another technology that can support workflow and security within a ward environment is Video Surveillance. Maternity wards for example require security solutions to mitigate the risks of infant abduction or mother and baby mismatch. More generally where single occupancy room arrangements are in use, the same video surveillance system can be used for general monitoring and linked to tags or movement detectors.

"Wired and wireless networks, Unified Communications, Location Services and the devices themselves all work together to deliver productivity benefits."
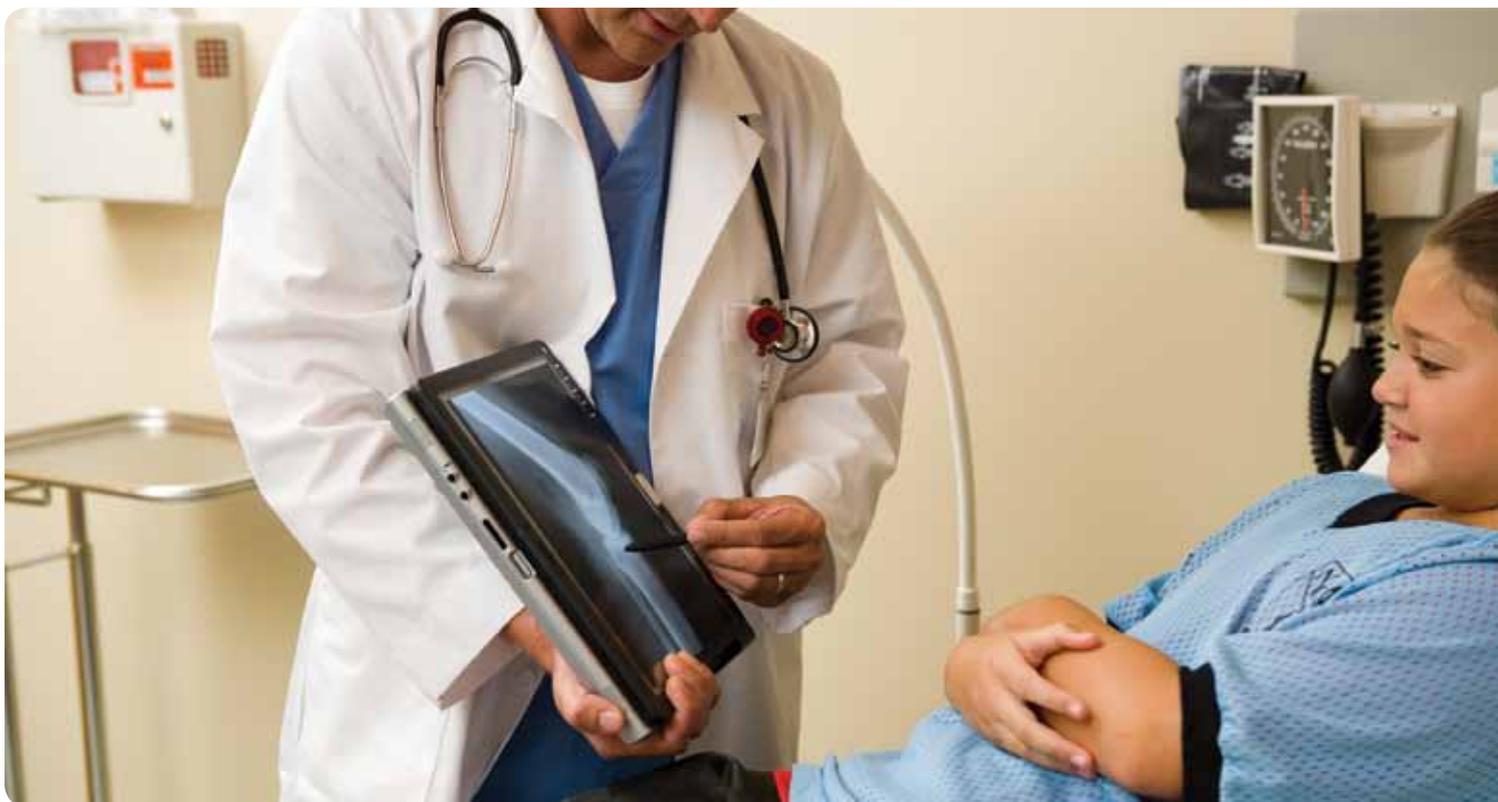
2.4 Translation Services

Healthcare organisations across the UK are often faced with a lack of language skills that can be critical to the prompt and correct treatment of a presenting patient's condition. It's a challenge that can be faced anywhere across the health and care spectrum, from a GP surgery, to A&E departments and other clinics in areas such as community and mental health. The distributed and repeatable nature of the problem makes it an obvious area for partnering between healthcare organisations to establish centralised support.

There are a number of traditional approaches to address this problem, including:

- Conversing through a friend or family member. Whilst convenient and generally available, there needs to be a good deal of confidence that what is being relayed to the patient or family is an accurate representation.
- Request a visiting interpreter from a professional register ensuring an 'in-person' experience. The concerns with this approach include lead times, possible minimum booking times and associated costs.
- Call on a telephone interpreter. These services are convenient and provide many language options, however they lack the face to face capability that is often so important (e.g. signing requirements) and can be charged by the minute.

Today, the quality of video and conferencing solutions mean that developing an in-house and/or cross-organisational solution to the problem is perfectly feasible. This means that health and care organisations can look to utilise the language skills that they may already possess. In addition, contact centre technology can ensure that the right skills are assigned to each task as required. Agents can be geographically diverse meaning that the solution could be shared between organisations across the health economy – offering another step towards integrated care. Implemented in this way,

Translation Services solutions are a prime example of an investment that returns more value as it scales.

Bradford Teaching Hospitals NHS Foundation Trust[8] is one organisation that was experiencing such problems and had the foresight to see technology as a solution. They invested in endpoint devices that provided a rich multimedia solution building on their existing infrastructure investments.

More information on the case study at Bradford can be found by following the link in the footnote below.

8 Bradford Teaching Hospitals NHS Foundation Trust: Case Study -
  http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/bradford_acute_fnl_4_29_13.pdf

2.5 Tertiary and Specialist Care

Tertiary and specialist care centres supporting areas such as cardiothoracic, cancer and children have particular needs when it comes to the scalable delivery of the services they provide.

Each organisation is highly dependent on referrals to sustain their businesses. A large percentage of those referrals come from secondary care organisations, so it is vital that they can be handled efficiently and effectively. For example, a secondary care clinician may seek decision support ahead of a referral in real time, or indeed an update on diagnosis.

Tertiary and specialist care organisations have particular requirements, such as:

- They must offer **flexible models of care**. Given the proportionally low numbers of such facilities, being flexible and agile in the way patients receive their care is very important. For example, having had an initial consultation, a patient may wish to receive care at a remote site of their choice.
- **Scalability** is business critical. Many tertiary and specialist care organisations are looking to develop a virtual ward capability, whereby they have constant presence in a secondary care organisation that has the flexibility to scale on demand. Added to this is the potential to scale out to international markets, hence introducing new revenue streams.

A combination of conferencing and video solutions would allow the extension of services to other organisations and hence supporting the virtual ward scenario. High quality or high definition video ensures the best possible face to face experience and the same basic video platform could be extended to deliver patient consultations at a location of their choice. The addition of presence technology would also allow tertiary care specialists to advise of their availability and ensure the best possible – and appropriate – accessibility for referring organisations, regardless of geography.

In summary, all of these things can be made possible by incremental investment in a video and collaboration based solution set.

Great Ormond Street Hospital for Children NHS Foundation Trust[9] began their journey to a collaborative environment in 2008, beginning with the establishment of a stable and enabling infrastructure platform. Since then the Trust has deployed collaboration and mobility tools that have allowed them to collaborate more effectively within their organisation and outbound to others. More information on this case study can be found by following the link in the footnote.

“High quality or high definition video ensures the best possible face to face experience and the same basic video platform could be extended to deliver patient consultations at a location of their choice.”

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9 Great Ormond Street Hospital for Children NHS Foundation Trust – Hospital Accelerates Digital Transformation –
   http://www.cisco.com/cisco/web/UK/casestudies/assets/pdfs/great_ormond_sh_ecds_cs.pdf

2.6 Out of Hours Services

Out of hours can be a highly pressurised time for NHS organisations. Working within the constraints of limited resources, it is critical that tasks are assigned to care professionals in an efficient manner. Indeed in January of 2013 a survey by HSJ/Capsticks revealed that out of hours care was a major concern for NHS Chief Executive[10].

'Hospital at Night' is common parlance within the NHS, used to describe the periods of time that hospitals run with reduced resources, and where a process is enacted to ensure optimum efficiency. It should be noted that these periods of limited resourcing can also extend to weekends and Bank Holidays.

The traditional approach is for Acute hospitals to assign a 'Hospital at Night' co-ordinator who is responsible for fielding and filtering calls from other parts of the hospital where specialist help is needed during these periods. Typically, the co-ordinator then assigns tasks to one or more care professionals on duty using for example a bleep system to notify them of the incoming task request.

As shown in Figure 2.6.1, this traditional Hospital at Night approaches can suffer inefficiencies in the paging process. There can also be risks associated with transcribing errors as the task is passed through the system. In addition, outside of an incident such as a 'crash call', there is little context available to the care professional when paged and often no audit trail to see when, or even if, a task has been completed. The co-ordinator meanwhile could find themselves tied to the role and unable to fulfil their normal duties.

Hospital at Night: Improving Out of Hours Workflow
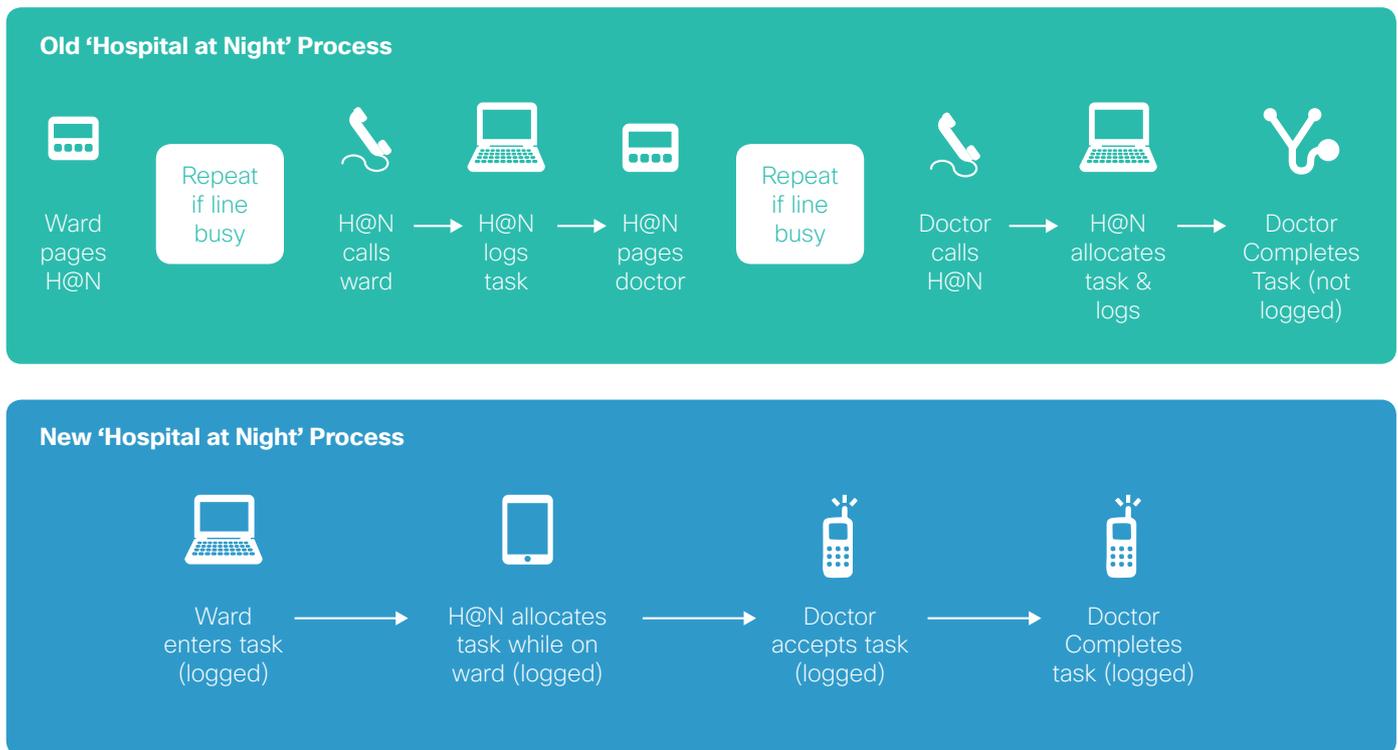### Old and new Processes

Figure 2.6.1 Hospital at Night – Old and New

10 Chief Executives Not Confident on Out of Hours Safety –
http://www.hsj.co.uk/acute-care/chief-executives-not-confident-on-out-of-hours-safety/5053046.article?blocktitle=#.UonxzOJtaSo (subscription required)

In 2011, the ACCA released its second report on the application of technology to business problems at Nottingham University Hospitals NHS Trust. Called '*Collaboration and Communication Technology at the Heart of Good Clinical Governance'*[11], it reported on the benefits to patient care as well as the consequent financial benefits associated with a new approach to delivering out of hours care, or 'Hospital at Night'.

Cisco's underpinning wired and wireless infrastructure, communications and collaboration platforms combined with workflow optimisation software from Nervecentre[12], has allowed the Trust to exploit the benefits of mobile access to information using a range of mobile devices. As is shown in Figure 2.6.1, the 'Hospital at Night' process is optimised at every stage:

- With the common infrastructure platform, everyone has access to the Nervecentre application;
- Wireless technology allows the Hospital at Night co-ordinator to monitor and assign tasks on the move using mobile devices;
- When a task is assigned, the care professional is able to assess contextual information, allowing an informed decision and hence prioritisation of tasks;
- Mobile devices allow access to Nervecentre and other clinical information on the move;
- A full audit trail exists so that the co-ordinator is able to check on progress against each task.

The ACCA document highlights a number of business benefits, including the release of the co-ordinator's time to patient care and financial savings associated with revised shift patterns – all enabled by better access to information.

> "A full audit trail exists so that the co-ordinator is able to check on progress against each task."

11 Collaboration and Communication Technology at the Heart of Good Clinical Governance' - http://www2.accaglobal.com/documents/CCT2011.pdf
12 Nervecentre Software - http://nervecentresoftware.com/

2.7 Patient and Visitor Experience

Patient entertainment through the delivery of bedside services is now commonplace in NHS organisations, while at the same time the availability of wireless guest access services is also widespread. Now, many organisations are looking at how they can further the citizen experience, whether a patient or visitor, through the use of new technologies. The proliferation and capabilities of new mobile devices, and in particular smart app technology, offer new channels of communication.

For the patient or visitor, apps are becoming available that will support wayfinding information, appointment booking (and reminders), waiting times, treatment and medication reminders, and the location and availability of services such as catering or transport.

Happily, there are benefits to the organisation as well. By collecting this information and processing it centrally the analytical output could include:

- Transit paths within the hospital, hence informing subsequent changes to improve signage.
- Queuing and waiting times allowing trending information over time that can be acted upon.
- Usage of facilities such as shops, cafes and vending machines to optimise footfall and a return on investment.

The same solution can also offer benefits to staff, particularly new or visiting professionals seeking to find their way around their new environment.

In summary the benefits are twofold:

1. Improved patient engagement and visitor experience.
2. Provides a rich source of data and analytical information to the organisation that they can use to optimise workflow and facilities.

The Cisco Connected Mobile Experiences[13] solution uses the Cisco wireless infrastructure and has the ability to detect and locate any wireless mobile device such as a smartphone or tablet. When combined with a growing number of apps being developed, it can help deliver the benefits listed above, for patients, visitors, staff and the organisation itself.

Miami Children's Hospital[14] has pioneered such a solution to support clinicians and provide more engaging experiences for patients and families. More information can be found by following the link in the footnote.

Other technologies that are being increasingly used to benefit patient and visitor experience are:

- Signage – Digital Signage to support wayfinding and other pertinent information with the flexibility to change as specific needs arise. Many organisations allow advertising of healthcare related services helping to create a return on investment.
- Contact Centre – for patient, families and carers, today's solutions support a single point of contact, multi-channel capability and offer flexible access so that agents do not need to be tied to one location. Contact Centre is covered for a specific use case in section 2.11.

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13 Cisco Connected Mobile Experience Solution – http://www.cisco.com/en/US/netsol/ns1205/index.html
14 Miami Children's Hospital – http://www.cisco.com/c/en/us/products/wireless/miami_childrens_hospital.html

2.8 Discharging the Patient

While patient care is the priority of any healthcare organisation, operational efficiency in order to sustain the business is also critical. One of today's main key performance indicators for NHS organisations is 'Length of Stay' – reducing the time that a patient stays in hospital where it is appropriate to do so.

One of the major reasons for unnecessary extended stays can be the result of inefficiencies found in workflow. Delays or even cancellations in downstream operations can be the result of one or more workflow problems higher up in the process map, all however having a negative impact on inpatient flows.

For example, inefficiencies in transport, catering, cleaning, bed state and even at a receiving organisation can often be traced back to one common cause. This is where clinicians do not have the ability to complete an electronic discharge promptly. The problem can be further complicated by the number of systems that need to be accessed in order to complete the process. When the discharge is delayed as a result, pharmacy services for example might be unavailable, and the patient is subsequently 'hotelled' for an extra night unnecessarily.

"The proliferation and capabilities of new mobile devices, and in particular smart app technology, offer a new channel of communication."

Length of Stay
Electronic discharge at the point of care

Tackling workflow inefficiency in areas such as:
- Pharmacy
- Cleaning
- Catering
- Transport
- Bed State
- Receiving organisations

Common cause of the problem is a lack of access to quality information at the point of care

Figure 2.8.1 Length of Stay: Electronic Discharge at the Point of Care

The key to this problem is providing access to quality information at the bedside or point of care. In order to achieve this there are three main areas to consider: devices; single sign-on and wireless infrastructure.

As described earlier, there are now a range of devices to support clinical mobility, from tablets to smart phones and even 'Bring Your Own Device' (BYOD)[15] solutions. However, it is also important to consider which applications are going to be used and how that information is rendered. In addition, single sign-on solutions will save a significant amount of time and frustration for clinicians.

NHS Tayside[16] is just one of many healthcare organisations that have deployed Cisco's BYOD Smart Solution. Faced with the demand to use new devices such as tablets and personal smart phones, but paying close attention to Person Identifiable Data issues, they used the solution to apply granular policies, allowing or denying users access to particular applications and services from specific devices and locations.

Another healthcare organisation that has implemented a BYOD approach is St. George's Healthcare NHS Trust[17] realising operational efficiencies and the delivery of information to clinicians at the bedside.

More information on both of these case studies can be found by following the link in the respective footnotes.

Where this approach hasn't already been adopted, Cisco's recommendation is to assess the business issues, re-evaluate mobility and collaboration strategies, and then implement the solutions described to enable electronic discharge at the point of care as well as other applications. Implementing such a solution can deliver mutual benefits: the organisation sees improved throughput of patients and lower waiting times; while the patient can be cared for at home or in a setting they are more comfortable in.

15 Cisco BYOD Smart Solution - http://www.cisco.com/web/solutions/trends/byod_smart_solution/index.html
16 NHS Tayside: Mobilising Healthcare (BYOD) - http://www.cisco.com/en/US/prod/collateral/vpndevc/ps5712/ps11640/nhs_tayside.pdf
17 St. George's Healthcare NHS Trust (Bringing Healthcare to the Patient Bedside) -
   http://www.cisco.com/cisco/web/UK/casestudies/assets/pdfs/st_georges_hospital.pdf

2.9 Remote Care Facilities

An ever increasing demand on healthcare means that capacity management has become a real issue for NHS organisations. As departments and clinics are stretched, attention is switching to the use of remote care solutions to relieve the pressure on traditional facilities and at the same time expand service reach across the health community.

Remote Expert Consultations
Use Cases: Prisons, Nursing Homes etc

- · Limited availability of medical expertise
- · Cost and dangers of patients transportation/ unscheduled diversions
- · Cost of travel for doctors
- · Timely access to healthcare for patients
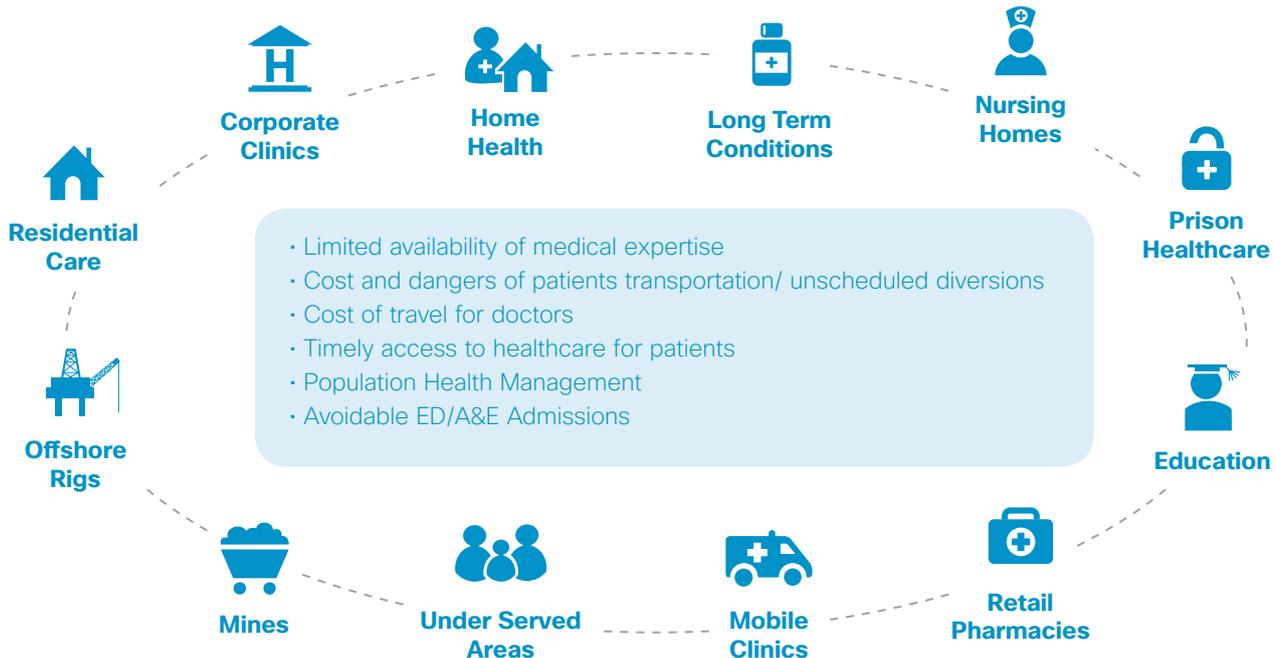- · Population Health Management
- · Avoidable ED/A&E Admissions

Figure 2.9.1 Remote Expert Consultations: Use Cases

There are many use cases for remote care as shown in figure 2.9.1, however for the purpose of brevity, this document will focus on two examples with very different returns on investment.

1. While all prisons have health teams, which may include doctors, nurses, opticians, dentists and mental health teams, it is sometimes necessary to arrange for the secure transport of prisoners to a NHS facility. This introduces a couple of significant challenges: firstly, the security challenges that are associated with transportation; and secondly, the cost.

   Each prison and NHS partner would need to develop their own business case, but there are clear opportunities for cost savings and reduced risk.

2. The second use case featured here is around Nursing and Care Homes. Globally, one of the focus areas for healthcare organisations is to limit the number of unnecessary frail elderly admissions into hospitals. While there are operational gains to the provider organisation, the patient also benefits by avoiding unnecessary hospital visits and the associated upheaval that ensues.

   Even though the Prison and Nursing Home use cases feature quite different returns, the solution is broadly the same. By using a combination of video and collaboration technologies, care professionals can provide virtual, remote care including scheduled clinics and decision support for local teams. Cisco has a range of such solutions from standard high definition (HD) video offerings to a solution

known as Cisco Healthpresence[18]. Healthpresence can interoperate with a choice of video endpoints that offer a high quality experience for face to face consultations, as well as third party medical devices at the 'patient end', with readings relayed to the 'doctor end' instantaneously.

To summarise, Cisco Healthpresence or other video endpoints (including mobile, video enabled devices) can be used to bring virtual healthcare expertise to these care establishments, helping to reduce the number of unnecessary hospital visits.

2.10 Extended Care

The potential benefits of Telehealth and Telecare have been debated for many years. Successive working groups and Government backed schemes have been set up to prove the case with what seems like an equal number of objectors. The result has been an often un-coordinated approach that has seen multiple pilots delivering pockets of success which rarely get repeated elsewhere.

Perhaps some of the best progress has been where the co-ordination has been strong. The Whole Systems Demonstrator[19] project and DALLAS[20] programme have seen some of the most structured attempts to deliver meaningful evidence.

Structure and repeatability are therefore key requirements, and from an IT perspective this translates into the adoption of standards, both at a solution and infrastructure level. And those standards are even more important as organisations across the health and care spectrum partner to deliver the best solutions based on patient and business need.

It's clear that emerging new models of care are driving a shift in focus from episodic care to patient well-being. Well-being is driven by a collaborative care approach where good clinical expertise is complemented by self-management and access to care professionals when needed.

Where a standardised approach is adopted, health and care organisations are able to build out the collaboration platform, extending beyond the remote care solutions described in section 2.9. Solutions can be deployed that enable people to self-help, self-manage and to be cared for in the comfort of their own surroundings.

Cisco Extended Care[21] is a new solution that supports the change in approach. It's a browser based health and well-being solution that connects patients and care teams so that they can interact at anytime from anywhere that they may have an Internet connection.

Cisco Extended Care supports:

- Scheduled and ad hoc video consultations.
- Highly secure messaging.
- Quality of Life questionnaires.
- Educational material.
- The ability to track wellness device readings.

All of these solutions support the emergence of new models of care in a range of disciplines across the health and care spectrum.

"It's clear that emerging new models of care are driving a shift in focus from episodic care to patient well-being."

18 Cisco Healthpresence – http://www.cisco.com/web/strategy/healthcare/cisco_healthpresence_solution.html
19 Whole Systems Demonstrator – https://www.gov.uk/government/news/whole-system-demonstrator-programme-headline-findings-december-2011
20 Delivering Assisted Living Lifestyle At Scale (DALLAS) – https://www.innovateuk.org/uk/healthcare
21 Cisco Extended Care - http://www.cisco.com/web/strategy/healthcare/extended.html

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Extended Care

Use Case: Long term condition management

Cisco Extended Care is a personal health and wellness collaboration platform, enabling patient engagement and care team interactions at any time and from anywhere.

The solution provides:

· Enhanced and efficient coordination

· Secure messaging

· Appointment calendar and scheduling

· Questionnaires

· Real time video collaboration

· Anywhere access to care team consultants

· Personalised content sharing

· Video platform to drive health and wellness awareness and education

· Open AP is to embed into and enable 3rd party applications and environments

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Figure 2.10.1 Extended Care: Use case

2.11 Community and Mental Health

From a solutions perspective, Community and Mental Health business requirements are very similar. Whilst there is always an element of inpatient focus, the emphasis is on home treatment teams and community support workers – in effect skilled care workers that are very mobile and require access to information on the move.

There are many ways in which collaboration solutions, such as Extended Care, can be adapted for patients to be cared for in a setting of their choosing, including the potential of self-care and monitoring. In Mental Health for example, early intervention is critical to the effective delivery of many services and mitigating worsening conditions. Adapted Quality of Life questionnaires enable patients to effectively self-rate their own well-being, while service delivery teams are able to monitor trends. In addition, video based solutions can enable the same teams to have face to face, but remote, consultations where behavioural changes can be assessed.

'Crisis Lines' are another area that could benefit from technology investment. Traditional approaches have found it difficult to provide a single point of contact that is easily remembered and easily reached. As described previously, modern Contact Centre capabilities can offer one number to call, hence meeting the 2014 requirement of a single point of access[22], while agents are unbounded by distance or physical location, with multichannel (phone, web, video) capability also available.

Taking an inward-facing view, there are particular operational models that can be made more efficient through the use of technology. Mobile care workers need access to information on the move with the ability to also update that information – and potentially introduce third parties for decision support purposes. Most of today's mobile devices are able to integrate tools that allow secure access to information with video and collaboration tools. Whichever approach is taken, connectivity and security must be paramount in any deployment.

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22 HSJ (subscription required): 'Drive to be Launched to Join Up Mental Health Crisis Care' -
  http://www.hsj.co.uk/5067249.article?WT.tsrc=Email&WT.mc_id=EditEmailStory&referrer=e2#.UuuymbTyBuQ

Another consideration is the operational business model of each organisation. With so many mobile workers, does it make sense for them all to return to their own workplace in order to complete a day's work or even during their working day? Most organisations will have a number of different offices and clinics that could be adapted to support virtual working. Using the same telephony platform, any individual can 'log in' to a telephone and self-provision their directory number, regardless of location. At the same time, pervasive wireless access allows them to 'hot desk' at any location to gain access to critical information, while the same video and collaboration platform enables staff to connect with each other. Consultation rooms in local facilities could also be positioned to enable consultations with remote specialists when needed.

This method of flexible working means that mobile workers become more agile. It also means that fewer people 'own' their own desks and that office space is used more effectively, hence contributing to estates rationalisation programmes.

2.12 Medical Education and Training

The concept of distance learning has been popular in the corporate world for many years. The ability to not only deliver webinars but also high quality video solutions has made information available when and wherever it is needed.

Medical education is the same and can be delivered in several ways:

- Ad hoc sharing of best practice information;
- High quality or high definition scheduled training sessions;
- Archived content that can be retrieved at a suitable time.

Ad hoc sessions would typically rely on a collaboration platform such as Cisco's Webex. With the ability to share information, a video 'talking head' and other facilities such as Chat, Question and Answer (Q&A) functionality and annotation, the solution provides everything needed for a webinar based approach to training.

In 2012, the BBC[23] featured an article on prostate surgery at Wexham Park Hospital, carried out by the use of robotics. The procedure was broadcast live across the world via webinar for the benefit of clinicians and for patient education. Though not reported directly in the article it also featured an interactive Q&A session and is a good example of a simple, yet scalable use case.

Other potential use cases could include:

- Scheduled training sessions;
- Video relayed to a Post Graduate Medical School;
- Archiving for later retrieval where students are unable to attend the live session.

Cisco's 'Capture, Transform, Share'[24] solution increases the value of video endpoints and make video available to people anywhere, at any time and using any device:

- **Capture** video using any device from smartphones to professional equipment. Applications include recorded lectures, training videos or recorded Telepresence meetings;
- **Transform** the captured content and optimise it for viewing from a choice of platforms and according to the type of network connection;
- **Share** the video content by either live streaming or making it available on demand.

The solution is particularly suited to medical education and training needs and allows a library of valuable content to be built and made available for later use.

23 Slough Hospital Hosts Live Prostate Operation Webcast - http://www.bbc.com/news/uk-england-berkshire-17527402
24 Cisco Capture, Transform, Share - http://www.cisco.com/c/dam/en/us/solutions/collateral/business-video/business-video/15_Minute_Guide.pdf

3. One Collaboration Platform

Each of the use cases in Section 2 are founded on either a specific operational process, element of workflow or specific healthcare setting and they all demonstrate the successful application of technology to business requirements. It should also be noted that each case is enabled by exploiting and/or expanding the same basic platform – consisting of mobility and collaboration services. This section discusses that relationship.

Relationship Model
Underpinning the patient journey and improved workflow

The Patient Journey and Improved Workflow

Use Cases

Hospital at Night

Remote Expert

Extended Care

Translation Services

Length of Stay

One Collaboration Platform

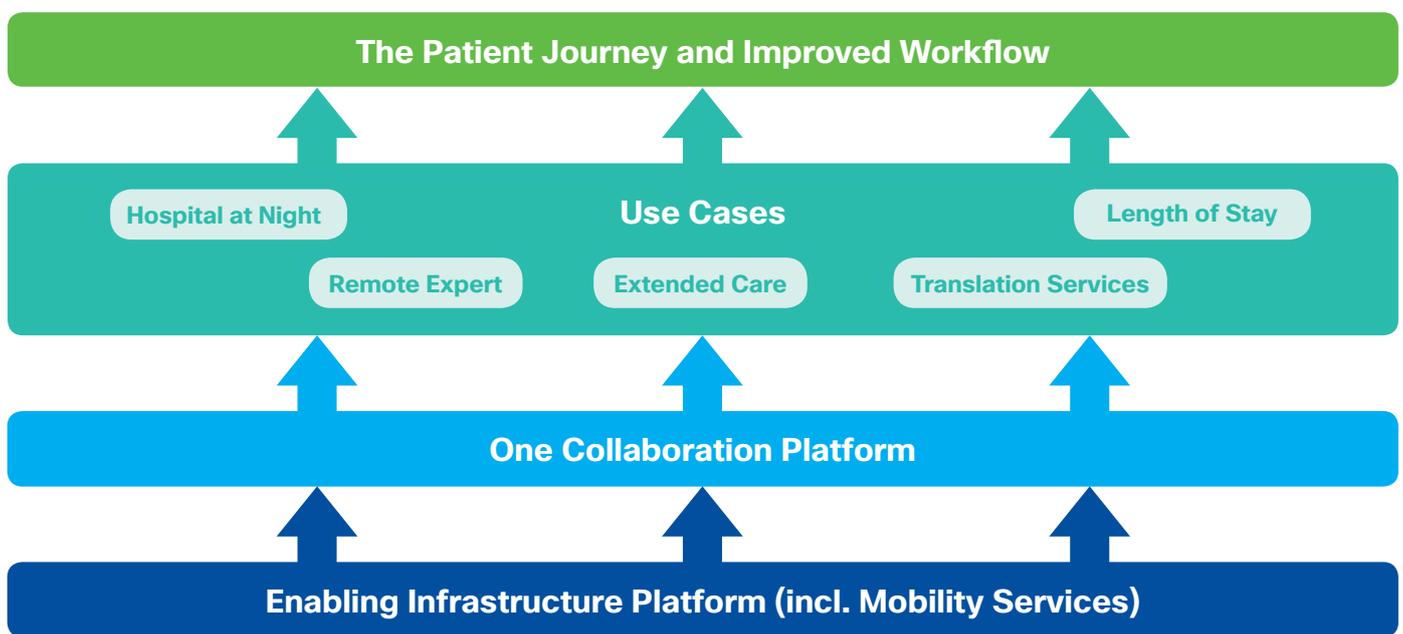**Enabling Infrastructure Platform (incl. Mobility Services)**

Figure 3.1.1 Relationship Model

3.1 Business and Technology Relationship

Figure 3.1.1 shows the relationship between the business requirements and technology, and the dependencies that exist.

The top layer represents the business needs of any healthcare organisation, namely supporting the patient journey through the system and delivering operational efficiencies and improved workflow.

Section 2 has discussed twelve use cases along that journey and a subset of these is shown in the diagram, supporting the business needs. As we have demonstrated, each use case is supported by a combination of mobility and collaboration technologies working together to deliver the right solution and capabilities at each step. The 'brains' of the collaboration platform are extensible, adding features or functionality as they are required.

The diagram also shows that the collaboration platform is dependent on infrastructure, including mobility services. As the foundation for everything above, it is critical that this is designed for performance, availability, scalability, security and functionality.

Hence, while it is not the intention of this document to advise on technology and design, it follows that much like the foundations of a building, the bottom layer of this model must be designed correctly to support the upper layers. The dependencies and linkage to business requirements are therefore quite clear.

3.2 Platform Components

Whilst it is true that the use cases are founded on the same basic platform, it is also true that the platform would normally be built in an incremental fashion to support each of the use cases. The traditional approach is to implement the control and management functions for basic telephony services and then add functionality on as needed basis.

Expanding on the 'One Collaboration Platform' layer described previously, Figure 3.2 demonstrates the breadth of available solutions and endpoints ranging from ad hoc conferencing tools such as IP Telephony and desktop video, through to high end immersive Telepresence video. This portfolio offers the broadest choice to suit each use case and business need.

"Each case is supported by a combination of mobility and collaboration technologies working together to deliver the right solution and capabilities."
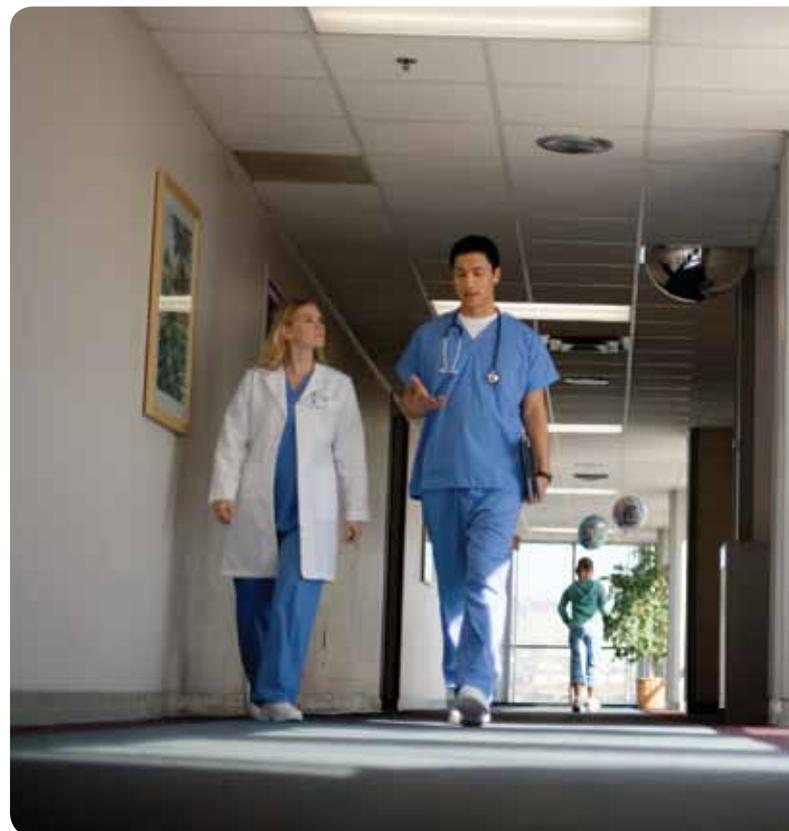
One Collaboration Platform
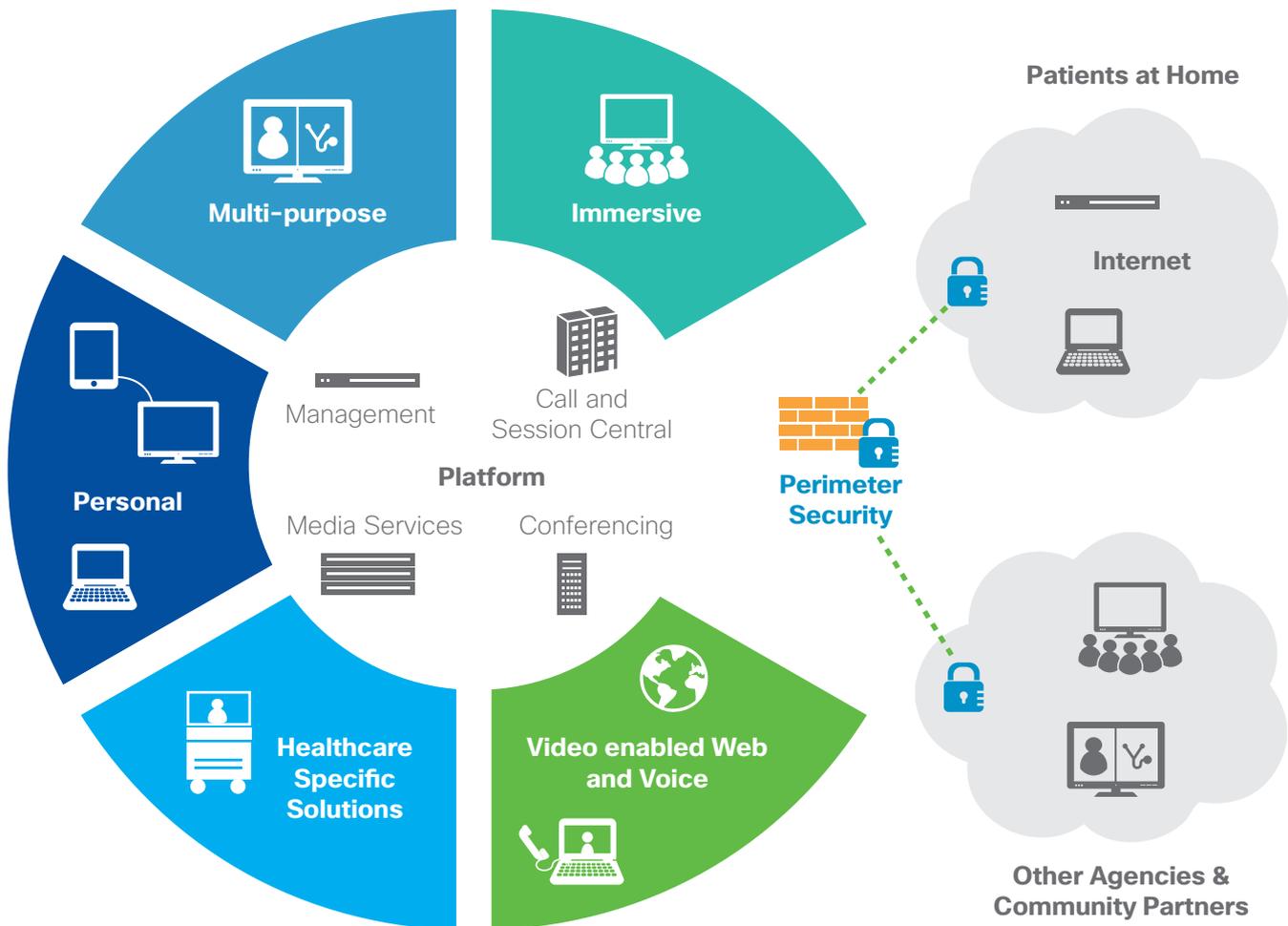## Multiple health and care use cases

Figure 3.2 One Collaboration Platform

The following is a summary of components that make up the platform and describes the functionality that they bring in order to support various use cases.

Unified Communications – Cisco Communications Manager[25] provides the management and control functions for the platform. It is therefore critical that it is planned and implemented carefully to ensure support for endpoints and services. The system supports basic IP telephony services including elements such as ad hoc conferencing and extension mobility.

Mobility – Cisco offers the most complete wireless communications solution set, including a range of Wireless Access Points and Controllers[26] to suit organisational needs. Our Access Points also support 'Small Cell' functionality, enabling mobile service provider coverage to be extended to difficult parts of a hospital building. With the fixed network infrastructure platform, our mobility solutions underpin and complement the Unified Communications platform.

25 Cisco Communications Manager – http://www.cisco.com/go/cucm
26 Cisco Wireless Solutions - http://www.cisco.com/c/en/us/products/wireless/index.html

Mobility Services – Wireless infrastructure should be carefully planned for optimum coverage, particularly where voice or location services are being deployed. In addition, consideration should be given to solutions to control BYOD environments such as Cisco's Identity Services Engine[27] (ISE) as well as functionality to ensure a clean wireless deployment, i.e. managing interference mitigation – particularly important in a healthcare environment.

Jabber[28] – this is Cisco's desktop and mobile collaboration tool. Within a single interface it supports voice and video, voice messaging, instant messaging, conferencing, desktop sharing and presence.

Jabber Collaboration Edge – helps you collaborate with anyone anywhere, on any device while offering security, ease of deployment, and open-standards interoperability. It particularly focuses on Guest (patient) to NHS Trust, Inter NHS Trust and Business to Business communications & collaboration.

Unified Presence[29] **–** it's important to single out Presence as an enabling tool. It allows users to advertise their availability, and to check the availability of others. This is particularly important for the use cases such as GP Consultations and for referrals to Tertiary and Specialist care.

Contact Centre[30] **–** today's Contact Centre technology supports multichannel contact including video capability. In addition, due to the nature of IP networks today, agents can be location independent. This type of technology is particularly appropriate for use in patient and visitor contact as well as specific use cases such as Crisis Lines in Mental Health.

Messaging[31] **–** solutions include basic voice messaging, integrated messaging (e-mail, web, mobile) and unified messaging (voice, fax and e-mail in one Inbox). The benefits offered are improved workforce efficiency with the ability to retrieve messages where and when you want, and in what way.

Telepresence Video[32] **–** a range of video endpoints to suit a range of business and patient facing needs – from High Definition cameras for use with desktop and laptop PCs to immersive room-based systems. In a healthcare environment, solutions can be positioned to support ad hoc consultations, remote care and high quality learning experiences.

Conferencing & Collaboration – Cisco offers a range of integrated collaboration technologies through other products such as Jabber, while the Webex[33] hosted (or locally Webex Meeting Server) offering supports scheduling of conferences with high quality voice and video, chat, and desktop sharing.

Physical Security (inc. Video Surveillance)[34] **–** there are a range of available solutions supporting video transmission, monitoring, recording and management as well as offering backward compatibility to older analogue systems. The solution is for general perimeter security requirements and for specific use cases such as around Maternity.

Digital Signage – consists of a suite of products including media players that support the delivery of scheduled or real-time content to screens. The display can be split into zones, supporting content delivery and advertising where appropriate – particularly suited to wayfinding, general hospital information, access to services such as pharmacy or taxis, and real-time alerts.

Connected Mobile Experiences (CMX) – built on the wireless infrastructure, CMX provides the right information at the right time. CMX was described in more detail in section 2.7.

27 Cisco Identity Services Engine – http://www.cisco.com/en/US/products/ps11640/
28 Cisco Jabber – http://www.cisco.com/go/jabber
29 Cisco Unified Presence – http://www.cisco.com/c/en/us/products/unified-communications/unified-presence/index.html
30 Cisco Contact Centre Solutions – http://www.cisco.com/c/en/us/products/customer-collaboration/index.html
31 Cisco Messaging – http://www.cisco.com/c/en/us/products/unified-communications/unity-connection/index.html
32 Cisco Collaboration Endpoints – http://www.cisco.com/c/en/us/products/collaboration-endpoints/index.html
33 Cisco Webex – http://www.cisco.com/c/en/us/products/conferencing/web-conferencing/index.html
34 Cisco Physical Security – http://www.cisco.com/c/en/us/products/physical-security/index.html

4. Cisco's Approach to Healthcare IT

First established in 1999, Cisco's dedicated UK Healthcare team provides advice and guidance to organisations across England, Scotland and Wales. Our long held belief is that it is the business and clinical challenges and opportunities that should drive IT investment.

To support this belief we first advocated an architectural approach to healthcare IT in 2001. Subsequently we developed a lightweight methodology based on well-established Enterprise Architecture principles. We call it 'Plan Down, Build Up'.

4.1 'Plan Down, Build Up'

'Plan Down, Build Up' is a simplified methodology for aligning business requirements and IT investment.
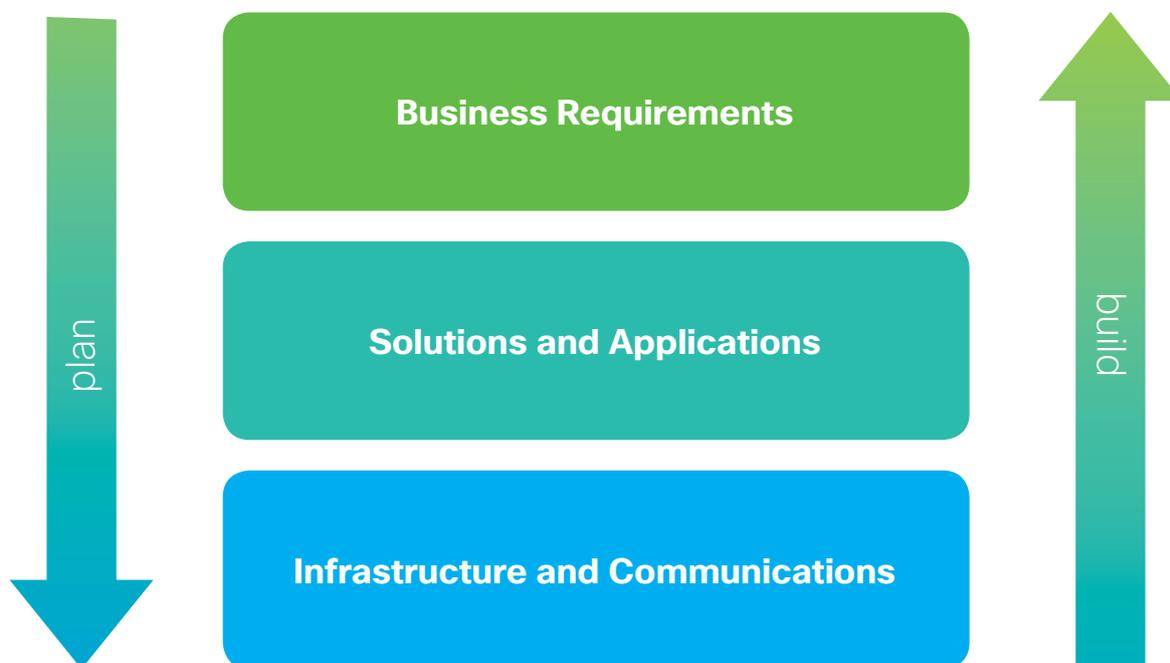

Figure 4.1 Plan down, build up

As shown in Figure 4.1, it recommends two phases:

Phase One: Plan

The planning phase should begin with the organisation's business plan, taking time to understand the vision, strategy, timelines and key performance indicators. To supplement this, the use of stakeholder opinion is encouraged. Every stakeholder group will have a differing perspective, and aligning their needs with the business plans of the organisation itself will create a set of views. These views can then be used to establish the type of business capability that is required, and only then to determine the solutions that should be deployed.

Once the solutions are identified, the functionality required from infrastructure and communications can also be determined. These lower layers are critical to successfully deliver against the previously identified business need, because they are the essential foundation for everything that has been planned before. Design and capability are major concerns in order to ensure the best chance of success.

Phase Two: Build

The planning phase demonstrates the linkage and dependency of NHS business need to the IT platform. The next question is 'Now that I have a plan, how do I go out and deliver it?'

The answer is the exact reverse of the planning phase. Delivery begins with laying the foundations, in other words the enabling infrastructure and communications platform. When built correctly, the platform will provide the IT capability needed for the solutions to work as they were designed, mitigating the risk of failed IT projects.

Solutions and applications can now be deployed with more confidence, ensuring the best chance of delivering the business capabilities that are needed, and hence responding to the business requirements identified at the beginning of the planning phase.

4.2 Next Steps

Cisco's blueprint 'ICT at the Heart of NHS Reform'[35] discusses both the business issues and the technical implementation of change. Divided into two volumes, it furthers the content of this document by using architectural models to link business and IT, while also offering generic, best practice advice for IT departments.

In addition, where appropriate Cisco works with customers to personalise the advice found in the blueprint, hence making it even more relevant to that organisation's needs.

If you would like to know more about Cisco's approach to digitising healthcare, or support with business-led IT planning, please contact your Account Manager from the list, or alternatively visit www.cisco.co.uk/healthcare.

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The majority of case studies featured in this document can be found at www.cisco.co.uk/healthcare

35 Cisco ICT at the Heart of NHS Reform – www.cisco.co.uk/healthcare