

BT and the NHS

60 years of service and innovation

On 5 July, the NHS marks its 60th anniversary. BT will be joining the celebrations, having worked with the NHS through six decades of change on a wide range of innovations.

To begin with, BT simply provided telecommunications services for hospitals, GPs and other health organisations through its predecessor, the General Post Office (GPO).

Since then, however, the company has provided NHS staff with ever more advanced communications services so they can provide better, safer patient care. And its researchers have developed ground-breaking communication and living aids for patients.

Today, BT is at the heart of the NHS' biggest ever IT programme – the National Programme for IT in the NHS – which is providing more than a million health service staff with new and better eHealth systems. This will underpin yet more modern, convenient services for patients; of a kind that could scarcely have been imagined in 1948.

Here we trace the path from the creation of the NHS to the present day.

1948: The Appointed Day

Monday, 5 July 1948 was the “Appointed Day” on which a new system of social security was created alongside a new National Health Service.

It wasn't quite the service we know today. Most hospitals were brought under the control of the Ministry of Health, but GPs remained private contractors – and local authorities were still responsible for some services, including ambulances and health visitors.

Yet the NHS was still unique. One of its historians says it was: “the first health system in any western country to offer free medical care to the entire population” – and the only one “to work on the principle of entitlement based on contributions” rather than insurance.

The General Post Office and telephone services

The telephone had been invented in 1876, and was in use in hospitals soon after. Medical magazine, The Lancet, announced that the managers of the Women's Hospital in Birmingham had “arranged to connect by telephone the in-door and out-door departments, and these with the doctors' residences” as early as 1880.

Lines between hospitals soon followed and allowed administrators to find beds for patients when their own wards were full. Meanwhile, GPs also installed telephones from the end of the 19th century; not least because an entry in one of the early telephone directories was useful advertising.

1948 to date: Hearing aids for all

As a government department, one of BT's predecessors, the GPO provided telephones and other communications to the new NHS. However, it was not only involved in telephones. As the creation of the new health service was debated, its Research Establishment at Dollis Hill in North London was working on a miniature vacuum tube, known as a “thermionic valve.”

It produced something small enough to be used in a portable hearing aid, which prompted the Ministry of Health to ask the Medical Research Council to review hearing aid design and whether the new health service could afford to make aids available to all.

It was eventually decided that the NHS should issue what became known as the Medresco hearing aid (the name derived from Medical Research Council), and the GPO made 50,000 available for the “Appointed Day.”

At the time commercial hearing aids were beyond the means of most families, so the Medresco aids were the first hearing aids genuinely available to everybody who needed them.

1950s: Help lines and bedside telephones

The years of austerity that followed the Second World War meant that developments in telecommunications were severely curtailed. By the 1950s, however, a few doctors were experimenting with new services that both made their lives easier and delivered a better service for patients.

For example, the Lancet reported in 1951 that the Glasgow local medical committee had set up a message centre that patients could call if they got no response from their doctor’s home. This allowed doctors to leave their houses unattended “on their half holiday and at weekends.”

The very first help lines appeared around the same time. In 1953 the Reverend Chad Varah, together

with the help of the GPO, set up “The Telephone Samaritans”.

In hospitals, meanwhile, the GPO rolled-out a bedside telephone programme. This was inaugurated at Acton Hospital in London in 1954. “The instrument and coin-box were on a trolley [and] a long length of flexible, insulated wire made it possible to plug the telephone into a socket on the ward,” the Lancet reported.

1960s: Helping people with severe physical disabilities

By the 1960s, GPO researchers had turned their attention to another category of patients, those paralysed by polio and spinal cord injuries, for whom they developed Patient Operated Selector Mechanisms (POSMs). Sometimes known as possums, these allowed people with very little mobility to operate communications devices by sucking and blowing on a tube.

In 1969, the Post Office Telecoms Journal reported: “The POSM converts the pneumatic signals from the mouth into electrical outputs. Up to 12 switching choices a second have been achieved in practice — an important feature when considering such applications as typewriting.” The Journal added that a POSM could be used with a Loudspeaking Telephone 56, so users could “dial their own calls to anyone in the country and on the continent.”

1980s: Radio pagers

The 1970s and 1980s saw a communications revolution. One innovation was radio paging, which supported a pager or “bleep” that alerted the person carrying it that a message was waiting for them at their message service or base.

Hospital, emergency and primary care services subscribed to the service as British Telecom Radiopaging rolled it out to major UK cities and eventually the whole country.

A GP in Birmingham described his practice’s experience of giving pagers to the doctor “on call” in the Journal of the Royal College of General Practitioners towards the end of 1981.

“5p coins are now an essential part of our emergency bags, enabling us to use coin boxes to contact base,” he wrote, adding that doctors were generally able to contact the surgery within ten minutes of receiving a bleep.

Pagers also helped in an emergency. In 1984, the staff newsletter Telecom Today reported that “the radio-paging service has won considerable praise for the swift help it provided after the IRA car bomb explosion at Harrods”, which killed six and injured 90 shoppers in the run up to the previous Christmas.

Life Page: A year later, in 1985, British Telecom Radiopaging offered a free bleep service to up to 250 patients waiting for organ transplants, so they could stay in constant touch with hospital transplant units.

1970s and 1980s: Decades of change

By the early 1970s, Britain, the NHS and telecommunications were changing rapidly. In 1974, the NHS went through its first major re-organisation, and ambulances and health visitors were brought into the health service for the first time.

Then, in the early 1980s, the Conservative government introduced the “internal market” reforms that split NHS organisations into “purchasers” and “providers.” Health authorities planned and purchased care from NHS hospital trusts for their local populations, while GP fundholders were given budgets to improve health services for their patients.

The General Post Office went through its own changes. In 1969, it ceased to be a government department and became a public corporation. Then, in the early 1980s, the Post Office Corporation was split in two, with its telecommunications arm becoming known as British Telecom.

A press release said the service, called Life Page, would allow people waiting for heart, kidney, liver and other organ transplants to “remain active and mobile” while “only a bleep away from vital surgery.” Patients were given free pagers by NHS administrators. Once they had their operations, the pagers were passed on to others on the waiting list.

1983: Mobile phones

As the radio-paging network was completed, the mobile revolution was on the horizon. The first mobile telephone, the first part of British Telecom’s Cellnet mobile phone network was launched in 1985, replacing the existing radiophone service. The Cellnet network initially covered London inside the M25 orbital motorway, but it was steadily rolled out to major cities and along motorways.

British Telecom worked with the NHS to develop uses for the new mobiles, and ran pilots to get them to health service staff. A report on one initiative to give mobiles to midwives said it gave them “added security when travelling in remote areas or in the event of a car breakdown.” Of course, it meant they could also be reached quickly when necessary.

1980s: Prestel and early data services

Meanwhile, British Telecom was developing one of the first data services to use the existing telephone network – Prestel. Using an adapted television set, users could access a database of information through a jack-socket connected to a telephone line. Prestel also offered an electronic mail service, which sent pre-formatted messages and provided access to other external computers.

Some GPs were early users, at least of the database. “The information on Prestel covers just about every imaginable area from travel to stocks and shares,” enthused a review in the Journal of the Royal College of General Practitioners in 1983.

“Specifically, in the medical area, you can expect to find information about a number of subjects, including fees, conference and training diaries, practice computing, locum and partnership vacancies, social welfare and health education.”

By the mid-1980s, enthusiasts were suggesting many uses for Prestel. The Scottish Poisons Information Bureau actually put its databank onto the service, making information about 10,000 potentially hazardous substances far more widely available. However, the advent of the micro computer meant that other services would overtake this innovation.

1980s: Hospital computers and networks

Early, punch-card operated machines had been installed in hospitals as early as the 1940s. What is now Barts and the London NHS Trust claims to have installed the first “proper” computer in the mid-1960s.

This was housed in a converted basement at The London Hospital in Whitechapel and was used for payroll and to process scientific data. “Real time” computing followed in the 1970s, when the first patient administration system (to book in and discharge patients) were also developed.

As these spread, centrally located, mainframe computers started to be connected to terminals in wards, clinics and other sites by telephone networks. From that point, computers and networks became inextricably linked – not only for users but for providers such as British Telecom.

HealthNet: In the 1980s, British Telecom developed a communications and information system for the health service, called HealthNet. The service came with its own terminal, the M2105, which could be used to access mainframe and micro-computers, Prestel and the early email service, Telecom Gold.

Eventually, BT turned HealthNet into a national, Internet Protocol-based network and messaging service (IP is the international set of technical rules for exchanging “packets” of information that the World Wide Web now uses). This promised to “enable earlier test results, speed referrals and bring GPs ‘closer’ to their area hospitals and clinics.”

1985: Imtran, x-rays by phone

Another experiment that foreshadowed the communications revolution was Imtran, a service for sending x-ray and body-scan pictures hundreds of miles by telephone in seconds.

The service (name was short for Image Transfer), was developed by British Telecom’s research laboratories at Martlesham Heath, near Ipswich – the successor to the GPO’s Research Establishment.

It used a TV camera to capture pictures of x-rays or medical records that were converted into audio-tones for transmission over the telephone network. However, its high cost limited take-up. A system of two “transceivers” cost £10,000.

1988: Optical memory cards for patients

Three years later, British Telecom launched its own personal medical record cards, called Recall Cards. These were optical memory cards, licensed by British Telecom from the Drexler Technology Corporation, on which up to 2 Megabytes of data could be recorded by laser.

The credit card sized pieces of plastic were used to record details of the ante-natal treatment received by 100 women, in a trial in 1988, for which British Telecom also provided computers and network support.

Although the idea of putting medical records onto optical or smartcards was discussed throughout the 1990s, the government eventually introduced the National Programme for IT in the NHS, which is pursuing a different model with records held on secure, centralised databases.

1998-2008: Further waves of reform:

Over the past decade, successive governments have continued to pursue an NHS reform agenda. Initially, they focused on increasing the capacity of the NHS, to cut waiting lists, and on introducing modern, 24/7 services for patients. More recently, English policy makers have focused on further change to the health service's planning and commissioning bodies and to increasing "choice" by introducing new providers to complement the work of NHS trusts.

IT has been vital to the modernisation of the NHS and to creating the electronic systems that will support choice and allow teams of clinical staff to effectively and safely treat patients – wherever they happen to be seen.

There were further developments for British Telecom in 1991, when there was a move towards a more open market in telecommunications which allowed customers to acquire services from competing providers using a variety of technologies. The company also unveiled a new trading name, BT, a new corporate identity, and a new organisational structure.

1990s: NHSnet and NHSmail

To support its modernisation agenda, the government published a major information strategy for the NHS in 1998, called Information for Health.

This stressed the importance of creating electronic health records to make it easier for clinicians to access vital information about their patients. It also stressed the importance of an NHS-wide network to allow staff in hospitals, clinics, surgeries and other settings to access these records and exchange test results and other messages with each other.

Building on its experience with HealthNet, BT built this network, known as NHSnet, as "the NHS' own information superhighway." In 1998, the government also announced the creation of the NHS' first, national email service, which was to run over NHSnet.

Although email services existed, proper email communication across the NHS was impossible because it lacked a coherent address book. So, BT compiled one.

1998: The NHS 50th anniversary website

As the NHS celebrated its 50th anniversary in 1998, BT also sponsored the National Health Service 50th Anniversary website: www.nhs50.nhs.uk.

This was one of the NHS' first websites and promised to provide "a fast and innovative means of

communicating with patients, staff and interest groups about the NHS and healthcare at home and in the community."

www.nhs50.nhs.uk put NHS-endorsed information about health issues onto the web for the first time and even created "health education interactive games" for young people. Health secretary Frank Dobson said the site was a significant step in "the drive to modernise the health service and take advantage of information technology."

1998: NHS Direct

A further step in the same direction was taken the same year, when BT was instrumental in setting up the nurse-led telephone helpline, NHS Direct, with the Department of Health.

The service was launched from 54 locations around England to give members of the public 24 hour a day, 365 day a year access to health information and advice.

BT provided the new service with its inbound telephony, routing and support through an Intelligent Call Management Platform and Network, which directed calls to the most appropriate centre. It also provided NHS Direct's private data network and the link to its web service.

NHS Direct became a special health authority in 2004, when it adopted a regional call centre structure and launched new services, including interactive TV. One way or another, 2 million people now use it each month.

Meanwhile, in 1999, the Scottish Parliament and Welsh Assembly were created, and responsibility for the NHS in Scotland and Wales passed to these new bodies.

BT won a £20 million contract to deliver the NHS24 service in Scotland in 2002, – an even more ambitious undertaking than NHS Direct, since the helpline was integrated with A&E, ambulance and other “out of hours” services.

1990s: Managed services and VPN’s

While BT was involved in national IT projects for the NHS, it continued to win contracts from individual NHS organisations. In 1996, it won its first managed service contract, from St James’ Hospital in Leeds, to install and maintain a new switchboard capable of handling 40,000 calls a day.

Meanwhile, its researchers were involved in trials that used teleconferencing to connect experts in everything from road traffic accidents to foetal medicine and skin conditions with ambulance staff, doctors in local hospitals, GPs and their patients.

In 1998, BT won a major contract from Cornwall Healthcare Trust to create a virtual private network (VPN) to link the Royal Cornwall Hospital with health services and GP practices across the county.

The VPN allowed staff to communicate using four-digit extension numbers for video and other links to be installed: “so a consultant at the Royal can examine and talk to a patient miles away, see x-rays and give advice to medical staff.” Many similar networks have followed.

2002: NHS Numbers for Babies

From 2002, BT also worked with the NHS Information Authority to introduce the NHS Numbers for Babies service, known less formally as NN4B.

The service makes sure that babies are issued with an NHS number within hours of birth, rather than wait until their birth is registered, which may be some weeks later. It helps to reduce record mix-ups and ensures that any vital treatment that a child receives in the first few days of its life is recorded.

When the system was introduced, BT explained: “Once a child is born, the midwife will enter the time, date and location of birth into the system, which then responds with the NHS number.” It also linked into other vital systems, including the Newborn Hearing Screening Service, which carries out hearing checks.

NHS Numbers are vital for the NHS Care Records Service that is being created by the National Programme for IT in the NHS. The ten-digit numbers will be the “common unique identifier” for information held in the system.

2003: BT helps to “digitise” the NHS

BT has been deeply involved with the National Programme for IT in the NHS since it was formed in 2002 to further accelerate the uptake of IT in hospitals and clinics and the integration of NHS services.

The programme is overseeing the creation of a new IT infrastructure for the NHS in England; the development of national digital imaging, electronic record, prescription and booking systems; and the delivery of better IT for trusts and other NHS organisations.

In 2003 and 2004, BT won three contracts, together worth more than £2 billion, to procure, integrate and manage the new broadband network; to develop some of the key elements of the electronic record service; and to improve IT across the London care community.

Commenting on the three contract awards in 2004, BT’s Chief Executive Officer, Ben Verwaayen, said: “These are BT’s biggest ever, and evidence of the new face of BT truly emerging. This is BT taking on world class competition on its own territory and winning.”

N3: The New National Network for the NHS, which became known as N3, was to become the largest virtual private network in Europe. When it won the contract, BT said: “The increased bandwidth will open up a host of new opportunities to 18,000 NHS sites in England”.

“GP surgeries, primary care trusts and hospitals will benefit from faster, secure access and the ability to share and view large data files, patient records, video links and visual materials, such as x-rays.

“This will enable greater co-operation between different parts of the NHS and faster, more efficient patient treatment.” The following year (2004), BT won the N3 contract for Scotland, which delivers similar benefits to around 3,000 NHS sites.

The Spine: BT is also designing, delivering and managing a new transactional messaging service for the NHS and a national patient record database. These and other services are sometimes referred to as the NHS data “Spine”.

The messaging service is designed to help communication between different parts of the health service. It underpins national projects, such as the online booking system Choose and Book, which not only allows patients who need hospital treatment to decide where to go, but also to book a time that suits them.

A patient quoted on the website of NHS Connecting for Health, the agency that runs the National Programme, said of her experience of using Choose and Book: “Within a couple of minutes it was all done and dusted, time, place, exactly what I wanted, as simple as that.”

The database has also been designed to hold NHS Summary Care Records. These are intended to give authorised health care staff access to key information about a patient, from anywhere in the country. The first records were created at pilot sites in 2007. At the moment, they hold details of allergies, adverse drug reactions and current medications.

An A&E consultant on the NHS CFH website said: “Very often, when trauma patients arrive they are already receiving treatment for other conditions but I have no knowledge of this. Sharing records electronically will help save lives.”

London LSP: BT is also the Local Service Provider for London, which means it is designing, delivering and operating services and applications for the NHS in the capital. When fully implemented, these will allow NHS organisations to keep detailed care records for their patients, access the national applications and exchange data with each other more quickly and efficiently than before.

2004: Picture Archiving and Communications System (PACS)

In 2004 BT was awarded a contract to roll out Picture Archiving and Communications Systems (PACS) in London. This new system enables images such as x-rays and scans to be stored electronically and viewed on screens, so doctors and other healthcare professionals can instantly compare new and old images at the touch of a button.

BT completed its rollout in 2007. This means that all acute trusts in London are now using digital x-rays every day, with trusts reporting an average saving of £250,000 in the first year of using the technology.

2005: The NHS Service Operations Centre (NSOC)

To manage its NHS contracts, BT built the NHS Service Operations Centre (NSOC). This delivers a single, end-to-end view of all BT’s health service operations 24 hours a day, seven days a week, so it can deliver the level of service required by the NHS.

Advanced technologies, such as the use of synthetic transactions, allow BT to monitor the performance of the system and pre-empt any potential service issues. And the “always-on” incident room allows teams of highly skilled specialists to work together instantly across different locations to resolve issues quickly should they arise.

2006: Wireless Hospitals

BT has been developing new solutions that work with the local area (wireless) networks that many large trusts have been rolling out over the past few years.

BT Managed Vocera, for example, uses Voice over Internet Protocol (VoIP) technology and a trust's LAN to convert text or vocal sounds into IP "packets" that can be transmitted over the network and reassembled by a receiving device.

In practice, this means that staff can contact each other instantly and without stopping what they are doing by using a voice-activated, wearable badge. There is no need for them to remember telephone numbers, because they can just say the name of the person, department or team they are trying to reach.

The Royal Cornwall Hospitals trust was the first in the country to adopt the new system, using a network that that BT installed, which is now one of the largest in the country.

Other services that make use of wireless LANs allow blood, drugs, surgical instruments and other vital assets to be tracked from manufacture to patient – greatly improving safety.

2007: N3 completed and voice enabled

In February 2007, BT proudly announced that it had made 18,000 connections to NHS sites via the N3 network two months ahead of schedule. "To achieve this in less than three years is a terrific effort," said Managing Director of BT Health, Patrick O'Connell, back in 2007. "The success of N3 already underpins many of the new transformational services that are being delivered by the National Programme for IT. The foundations for the project are now in place."

Today there are more than 30,000 connections throughout England and Scotland. Richard Granger, the director general of NHS IT, emphasised that N3 cost only 40 per cent of NHSnet, even though the old network had connected only 10,000 NHS sites. The cost benefits increased when N3 was voice enabled in the summer of 2007.

NHS trusts can now connect their own Voice over Internet Protocol networks to N3, make free calls to other VoIP enabled sites and get cheaper calls to mobiles. BT also runs a hosted IP telephony services so that smaller NHS organisations, such as GP practices, can benefit.

2007: Community of Interest Networks (COINS)

Meanwhile, BT has continued to deliver innovative communications solutions not just to NHS trusts but to entire health communities.

In February 2007, for example, it won contracts with five NHS organisations to develop Community of Interest Networks (COINS). These are high capacity networks which link hospitals and smaller sites, such as GP practices, remote clinics and outreach services.

Merrill Hayes, programme manager at United Lincolnshire Hospitals NHS trust, said its new network had allowed it to implement digital imaging systems known as Picture Archiving and Communications or PACS in all of Lincolnshire's hospitals.

"This provides significant financial and clinical benefits," he said in a press release in February 2007. "X-rays can now be moved between hospitals in seconds rather than days when film was used."

Many COINS have been installed and more are in development today. Meanwhile, another managed service, BT Mobile Health Worker, uses remote access technology and mobile devices to allow healthcare professionals to access clinical records, support systems, databases and email securely from home, from remote clinics and while visiting people in the community.

2008: Telehealth

BT is at the forefront of what are often called telehealth or telecare services, which use devices in people's homes to monitor their health and help them to remain independent, while being able to summon help when necessary.

It was involved in a "virtual research centre" for care in the community set up by the Department for Trade and Industry

in 2002 as part of a project to explore how "coming technologies" will affect the way that people live, travel and do business.

And it helped to run one of the first major telecare pilots, which took place in Liverpool in 2006. The British Journal of Healthcare Computing reported: "There are 12 sensors in every home connected be secure broadband channel to a datacentre at BT's laboratories."

Keen to further explore how telehealth services can support patients with long-term conditions, the government announced in May last year that three health communities had been awarded £12 million to run telecare pilots on a much larger scale than earlier trails such as the one in Liverpool, which had just 20 clients.

Since the NHS was set up, the service and the technology used to support and deliver it have changed dramatically; but BT has always been at the forefront of innovation and at the heart of plans to turn innovation into mainstream NHS practice. It now sits at the heart of the NHS' biggest ever IT programme – the National Programme for IT in the NHS.

BT's researchers have developed a number of ground-breaking innovations that have been of direct benefit to thousands of patients over the years. Today, researchers at the successor to the GPO's Research Establishment, Adastral Park, are working on telehealth and telecare devices that will help the NHS and other public services to support people directly in their communities and homes.

Change has not always been easy; and some advances that were ground-breaking at the time may now seem quite mundane. But over six decades, both the NHS and BT have been able to harness technology to build a health service that can do things its founders could barely have imagined.

BT will continue to work with the NHS to do even more in the future. It will be fascinating to see the developments the next 60 years will bring.



Offices worldwide

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