

***The Impact of
e-Health and
Assistive
Technologies
on Healthcare***

TeHIP

The e-Health Innovation Professionals Group
of IHM, ASSIST & BCS HIF

Foreword

This is the Report of the Study *The Impact of e-Health and Assistive Technologies on Healthcare*. It has been undertaken by TeHIP - The e-Health Innovation Professionals Group of IHM, ASSIST and BCS HIF.

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- British Computer Society Health Informatics Forum (BCS HIF)
- Department of Trade and Industry (DTI)
- Department of Health

The Group's patron organisations are the following:

- Institute of Healthcare Management (IHM)
- Association for ICT Professionals in Health and Social Care (ASSIST)
- British Computer Society Health Informatics Forum (BCS HIF)

The members of the Group who undertook the Study and produced this Report were Mike Andersson, Keith Clough, Ian Jardine, Linda Kennedy and David Preston. They were assisted by Mik Horswell and Gill Kelly.

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www.tehip.org.uk

study@tehip.org.uk

¹ www.e-Health-insider.com

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1 Introduction and Methodology

1.1 Introduction

This is the Report of the Study *The Impact of e-Health and Assistive Technologies on Healthcare* undertaken by The e-Health Professionals Innovation Group (TeHIP). We were particularly interested in the use of technology which:

- reduces patient journeys, hospital visits and hospital admissions
- saves the time of healthcare professionals
- supports individuals living at home to look after themselves
- improves the quality or effectiveness of the care or treatment that is delivered.

We gathered opinions from a number of clinicians, healthcare managers, informaticians, equipment and service suppliers as well as other researchers. This was done by means of questionnaires and interviews. All the participants were invited to a workshop, hosted by the Department of Trade and Industry, to validate the findings of the Study to that point and to explore the next steps.

It is hoped that the Report will encourage and facilitate the application of appropriate technologies to support the modernisation of healthcare service delivery. At the same time the Report is intended to identify effective procedures and practices which may be extendable or transferable to other disciplines and/or to other organisations.

TeHIP is grateful to all those who contributed to the Study and, in particular, would like to thank the British Computer Society Health Informatics Forum, the Department of Trade and Industry and the Department of Health who sponsored the project.

1.2 Background

In 1998, as the IHSM Telemedicine & Telecare Project, we published a report¹ on the potential impact of telemedicine on the delivery of health services. It concluded that these technologies had the potential to provide significant benefits in the delivery of healthcare.

The introduction of these technologies has been slower than we anticipated and only a few of the potential benefits have been realised. Most of the applications introduced so far have been single-discipline, local and small. As a result they have been individually difficult to justify financially. However, the policy context has now altered with:

- a growing emphasis on service modernisation, patient choice, and the promotion of self-care (the NHS Improvement Plan² envisages an important role here for telecare)
- a convergence of the Information and Communication Technologies (ICT) of e-Health, telemedicine and telecare

¹ Jardine I, Clough K, et al *Telemedicine and Telecare: Impact on Healthcare*, published by the Institute of Health Service Management (IHSM), May 1998. Copies available from study@tehip.org.uk

² *The NHS Improvement Plan: Putting people at the heart of public services* available from [this page](#) on the Department of Health website.

- the National Programme for IT (NPfIT) providing an infrastructure through electronic records and communications links which should support many more of these services
- a recognition of the interrelationship between social care and healthcare in working not only to prevent clients becoming patients but also to support patients in returning to less acute environs, including home.

The aims of the current Study were to:

- identify what changes have taken place and the progress that has been made since our first report
- establish the extent to which e-Health and Assistive Technologies are being implemented and then used successfully
- determine the factors that encourage take-up of e-Health and Assistive Technologies
- identify potential obstacles and barriers to implementation.

1.3 Methodology

The Study was undertaken by means of a literature review, interviews and questionnaires. Altogether over a hundred people (see the [Annex listing the contributors](#)) took part in some way.

The people we interviewed initially were selected by reviewing those in the field of e-Health already known to TeHIP members. As the intention was always to ensure a full range of backgrounds and interests, a second stage was to add in others who we believed would have a view or an interest in the field of e-Health.

A similar process was adopted in selecting those who were invited to complete the questionnaires.

Those who contributed included:

- Clinicians
- ICT professionals
- Academics and researchers
- NHS managers working in trusts, PCTs and Strategic Health Authorities
- Chief executives and other senior representatives from suppliers of equipment or services and other commercial organisations
- Directors, senior managers and policy makers from the Department of Health, NHS Connecting for Health and other DH agencies
- Representatives from the NHS Confederation, Professional Bodies and other organisations with an interest in the field.

The clinical staff included:

- GPs
- Nurses in the primary care and acute settings
- Consultant surgeons, physicians and pathologists.

In some instances interviewees had more than one role (for example clinician and ICT academic, nurse and ICT lead).

All those who had been interviewed or answered a questionnaire were sent a summary of the initial findings and (unless they had already declined) were invited to attend a Validation Workshop. Those who accepted the invitation were sent a summary of the [interviews](#) and [questionnaire responses](#) prior to the Workshop.

The one-day Workshop, to validate the findings and to explore the next steps, was attended by about 40 people. A [summary of the outcomes](#) was subsequently circulated to all those who attended.

During the course of the Study, we submitted a Poster of the early findings of the Study to HC2005 and gave a presentation to the ASSIST 2005 National Conference.

1.4 Scope

The Study is concerned with the use of e-Health and Assistive Technologies in England. There is a brief discussion of their use elsewhere in [Annex E](#).

1.5 Terminology

E-Health and Assistive Technologies are rapidly evolving concepts. Along with telemedicine, telecare and similar terms, there are no agreed definitions for them and, even if there were, they would soon become out of date.

As noted earlier, the Study was particularly concerned with electronic or digital technology that:

- reduces patient journeys, hospital visits and hospital admissions
- saves the time of healthcare professionals
- supports individuals living at home to look after themselves
- improves the quality or effectiveness of the care or treatment that is delivered.

This broadly set out the aspects of e-Health and Assistive Technologies with which we were concerned.

By **telemedicine** we generally mean the provision of health services remotely in time or place. The term **telecare** is used similarly for the delivery of care.

Other terms describing the uses of the technologies in question can cause confusion. In general we have used other terms as follows:

- A **device** is a piece of equipment (which may incorporate its own software) used as part of an application. Oximetry monitors, blood pressure monitors and video conferencing viewing stations are examples of devices.
- An **application** uses devices together with the necessary software and communications provision to enable a medical or caring function to be carried out. An example is home monitoring equipment linked to a suitable communications or service centre.
- A **service** is what is provided to patients or clients. It is the use of one or more applications supported by the necessary care and technical staff. An example of a service is the provision of home monitoring, response centre facilities and domiciliary staff providing a service to a number of clients.
- Most services rely on **monitoring centres**. Depending on their function and technology, monitoring centres are also known as response centres, call centres or communications centres. Monitoring centres receive calls from people, information or data from devices and applications, or a combination of both calls and data.

Broadly speaking, and in the context of e-Health, **real time** information or data is sent continuously as soon as it has been collected. It is acted on immediately by the receiving system. Video conferencing is an example of real-time communication.

In general if information or data is sent **asynchronously** or using **store and forward** techniques, it is sent after a delay, in a batch or not acted upon immediately. E-mail is an example of a store and forward means of communication.

Examples of the technologies under consideration include:

Technology	Example(s)
Video conferencing	<ul style="list-style-type: none"> • Virtual multi-disciplinary team meeting in Cancer Care • Support for Minor Injury Units • Training and supervision • Prison to hospital
Remote monitoring of physiological or daily living signs (real time or asynchronously)	<ul style="list-style-type: none"> • Falls monitoring • Physiological monitoring of chronic COPD at home
Virtual visiting	<ul style="list-style-type: none"> • Remote supervision of home dialysis • Nurse visits to terminally ill patients
Store and forward referrals (for example sending history plus images for expert opinion)	<ul style="list-style-type: none"> • Teledermatology
Web access to own health records and guidance	<ul style="list-style-type: none"> • HealthSpace
Telephone and Call-centres	<ul style="list-style-type: none"> • Tele consultation • Reminders for medication and appointments

1.6 Document Structure

This document consists of six main sections. Apart from this introduction they are intended to be "stand-alone" so that they can be read in isolation from the rest of the Report. There is therefore some intentional overlap and duplication between the sections.

Section	Contents
1	This introduction.
2	<p>Outlines how e-Health and Assistive Technologies can be used in the contexts of:</p> <ul style="list-style-type: none"> • Self Care and Prevention • Home/domiciliary care • Hospital and Specialist Care <p>It covers a wide range of technologies and applications including:</p> <ul style="list-style-type: none"> • NHS Direct • web services • equipment that can be used in the home such as alarms, sensors and monitors • equipment and applications for use by clinicians such as PACS.
3	Discusses the impact on patients and clinicians with the emphasis on specific conditions. Information on a particularly successful project for care of leg ulcers is included.
4	Reviews the implementation of e-Health and Assistive Technologies to date. It then considers issues, as perceived by those contributing to the study, that have been barriers to adoption in the past or that need to be addressed in order for progress to be made.

Section	Contents
5	Provides guidance on how to initiate and implement successful projects for those working at local level. There are also suggestions for actions to be taken at a national level to support and encourage local activities.
6	Concludes the Report. It discusses the way forward and makes a small number of recommendations to be acted on at local, specialty or national level.

In addition there are several Annexes:

Annex	Contents
A	Summaries of the findings from interviews
B	Detailed breakdown of the questionnaire responses
C	Summary of the outputs from the Validation Workshop
D	List of those who contributed to the Study
E	Brief discussion of E-health and Assistive Technologies beyond England
F	Bibliography
G	Glossary of abbreviations/acronyms.

2 Uses of e-Health and Assistive Technologies

2.1 Introduction

This section of the Report provides some examples of how e-Health and Assistive Technologies can be used in the following contexts:

- Self Care and Prevention
- Social and Domiciliary Care
- Hospital and Specialist Care

As will be seen, the distinction between these is not clear cut.

It is clearly in the interests of the public, social services and the NHS if people can avoid ill health or the need for care in the first place. However, when people do suffer from ill health, it is important to minimise the effects and prevent deterioration as far as possible.

E-Health can make an enormous difference to self care and prevention. It is increasingly recognised that providing people with reliable information in connection with:

- healthy life styles
- recognition of symptoms
- conditions and their treatment

is an important part of this.

When people need help to look after themselves, they are often admitted to hospital or residential accommodation. There are many ways in which e-Health and Assistive Technologies can support patients so that they can stay at home instead.

E-Health and Assistive Technologies also provide many benefits for carers as well as health and social care professionals. For example, it is often possible to lighten the burden by reducing the number of physical visits that are necessary to care for a person who is living at home.

Clinicians working in GP surgeries, clinics and hospitals often need support or expert advice from peers or specialists who are at other locations. With all aspects of healthcare, including diagnosis and treatment, becoming increasingly complex and sophisticated this demand will increase. The availability of specialists, particularly out of hours, is already a problem. In the longer term, the NHS is expected to face significant challenges with workforce shortages. Both here and abroad, e-Health has already demonstrated significant benefits in hospitals as well as other healthcare premises such as GP surgeries and clinics.

The rest of this section explores all the issues above in greater detail.

2.2 Self Care and Prevention

2.2.1 NHS Direct

There is a growing emphasis, encouraged by Government, for all of us to take greater responsibility for our own health. NHS Direct is proving to be a highly successful first route of access for people with health concerns or who have had minor accidents. The telephone help lines, staffed by nurses working to clinical algorithms, are able to provide immediate advice to callers based upon their own record of signs and symptoms. Callers will always be advised to seek further help from an appropriate

part of the NHS (such as a walk in clinic, GP, hospital etc.) if the information they give is unclear or the symptoms suggest something serious.

In addition to the original telephone service, NHS Direct now provides a web site (see below) and access via digital interactive TV (DiTV).

2.2.2 Web sites and other electronic media

2.2.2.1 NHS Gateway

The NHS Gateway site¹ is a useful starting point for any person wanting to know how to access the NHS and understand how it works. From the many linked web sites it is possible to find information on NHS services, both locally and nationally, as well as information about clinical conditions and recommended treatments. In addition, there are links to the web sites below. These also provide advice on self help, including lifestyle changes that are known to be beneficial, and management of chronic conditions.

2.2.2.2 National electronic Library for Health (NeLH)

The National electronic Library for Health², or NeLH, provides access to an extensive range of information including guidance and protocols published by National Institute for Health and Clinical Excellence (NICE). Whilst NeLH has been developed as a resource for clinicians and health sector managers, this is an open website that has links to and from many other health-related sites. Patients and carers with reasonable knowledge can search for clinical guidelines, including treatment options, for particular conditions.

2.2.2.3 NHS Direct Online

NHS Direct Online³ is a comprehensive website that allows simple keyword searches for information on signs and symptoms. The home page also has the following direct links:

- Find out about illnesses, operations, test and treatments
- Visit the Best Treatments website for the latest treatment options
- Get advice on common health problems with the self-help guide
- Find the nearest doctors, dentists, opticians and pharmacies
- Try these new interactive quizzes and calculators - these allow the user to understand the impact of actions such as quitting smoking, taking more exercise or eating more fruit and vegetables.

In addition, a personal HealthSpace has been developed that allows the users to set up and keep track of their own health records including medication, hospital or GP appointments, and relevant websites that are useful for their particular conditions. There is also the opportunity to use the site to Choose and Book a hospital appointment where a referral has been agreed by a GP.

The HealthSpace concepts are still in their infancy, so neither widely used nor tested, but suggest a very radical way for the public to think about how they manage their own health and associated records.

2.2.2.4 Other Web Sites

It is also possible, via a simple search, to find many websites related to any number of health problems. For instance, searching for "Asthma" or the phrase "Breast Cancer" generates, in each case, well over 10 million hits in a fraction of a second.

¹ www.nhs.uk

² www.nelh.nhs.uk

³ www.nhsdirect.nhs.uk

Clearly the worry for individuals who take the approach of using results from a standard search engine to understand their health problems is that, as with any website, it is necessary to know the authority with which it has been established. The volume of sites that can be accessed is huge and can be overwhelming. Whilst many people will be able to distinguish valid information and advice from that which is less reliable or even potentially dangerous, there is a need to provide education and information on how to maximise the potential benefits whilst minimising the possible risks. These was clear feedback from the [Validation Workshop](#) that tools and education - possibly via schools, NHS Direct or both - should be available for patients to access and use information.

2.2.2.5 Television and Radio Programmes

More and more television and radio programmes are developing story lines based around health issues. Examples include:

- East Enders covering HIV and Aids
- Coronation Street covering Cancer followed shortly afterwards by Alzheimer's disease
- the Archers covering Breast Cancer.

In addition there are many programmes, too numerous to mention, which are set in hospitals and develop story lines around a host of medical or social care issues. It is now routine practice for viewers and listeners to be directed to other sources of information if they have been affected by the programme storyline. The sources given are often the web pages for the programmes themselves or the numbers of help lines that will direct callers suitably if they do not have access to the internet.

2.2.3 Monitoring Clinical Signs and Symptoms

New digital and other technologies make it possible, using telephony (land line, mobile or video phone) or computer links, to monitor clinical signs without a clinician present. This means that, for patients to be monitored, they do not need to be in a clinical setting such as a GP surgery or hospital outpatient department nor, if they are less mobile, do they need to be visited by clinicians.

The benefits to patients of having their conditions monitored without the need to leave home or to make other changes in their routines are great. Many patients strongly welcome being able to avoid difficulties such as having to arrange transport to an appointment, or needing to rely on others to care for children or other family members in their absence. It is acknowledged that this may not be the case for all patients, conditions or specific appointments.

Some of the other key benefits are:

- More regular and appropriate monitoring
- More timely access by GPs and other clinicians
- Better understanding of changes to a patient's condition throughout the day and night
- Opportunities to adjust medication according to the variability of the monitoring results
- Options to arrange a video or telephone consultation with a patient or carer at a mutually convenient time
- Improvements in efficiency and workflow.

2.2.4 Reminder Units

As an extension to the process of monitoring clinical signs and symptoms described above, it is possible to provide patients with additional support to care for themselves

at home. For patients who understand and are normally able to self-manage their long term conditions - such as diabetes or heart disease - there may come a time when, because of frailty or memory loss, a reminder system is needed to ensure, for instance, that medication is taken at the correct times.

Reminder units and other equipment are discussed in greater detail in the next section on social/domiciliary care.

2.3 Social/Domiciliary Care

2.3.1 Introduction

This sub-section is concerned with devices which can be used in the home and applications which can be accessed from the home. It includes self-help and services which can extend independent living.

There is a blurring of lines between the technologies which support healthcare and those that support social care. This is especially true of the Assistive Technologies. Many of the users to benefit are the elderly who often require both social care and healthcare. Provision of appropriate social care can delay the need for healthcare.

In a number of its reports, for example *Assistive Technology: Independence and Well-being 4*¹, the Audit Commission breaks telecare/telehealth into the three categories:

- Supportive
- Responsive
- Preventative

The categories can be applied to all social care and healthcare devices and applications. The three terms can be amplified:

- The technologies can be used to **prevent** an incident from occurring, to prevent the need to leave home, or to prevent the worst effects of an incident.
- The technologies can **respond** to an incident or to a condition of the patient/client. The response may be advice but will usually be to alert a carer or a specific service to resolve the situation.
- Some technologies (such as chair lifts) provide direct physical **supportive** help whilst others can be used to summon support when needed. A further group supports self-help so that individuals can maintain their independence.

There is a wide range of applications and devices in use but most have only been implemented in a single locality. Many could be easily expanded to cover more patients or clients - not necessarily in the same locality. In addition, some devices or applications could be used in different situations.

The technology needed in the home is relatively cheap. Some equipment can just use an existing telephone line when it is free, but many devices need a dedicated link that is available for use at all times. The links are to provide a service, to be responsive and/or to alert support where necessary. Communication, whether using a shared or dedicated link, is normally with a monitoring centre but sometimes direct to a hospital, GP or carer. Some monitoring centres are run by the NHS or by social services though many are disease or condition related and run commercially. There is considerable scope for rationalisation and for economies of scale.

The rest of this sub-section covers:

¹ Available in html and pdf (with related documents) from:

www.audit-commission.gov.uk/olderpeople/olderpeoplereports.asp

- Examples of applications and devices
- Impact and implications
- Provision of services
- Comment and suggestions

2.3.2 Examples of Applications and Devices

2.3.2.1 Telephony

NHS Direct is the most widely available service. It is national and nurse led. In its most widely known form it provides advice to those contacting one of its call centres. It is also available as a web service and an interactive digital TV service is currently being implemented. There are services similar to NHS Direct in parts of the UK other than England. Some GP surgeries (apparently against PCT recommendations) are now putting the NHS Direct number on their answering machine message before the number for their out-of-hours service.

There are varieties of “**Dial-a-Doc**” systems. In some cases GPs allocate a time slot for dealing with telephone callers. In other practices, they allocate one doctor to take calls and provide advice or triage while their colleagues deal with patients who have appointments. A few surgeries will respond to emails from their patients. There are also several commercial services where one can phone a doctor or nurse for advice. These are often allied to private health insurance.

Telephone reminder services use automated dialling to call patients with recorded messages that they have a hospital appointment the next day. The patient then has the option to speak to an individual to change the appointment. Once installed, these systems result in significantly reduced levels of DNAs (“did not attends”). Similar systems have been successfully trialled to remind patients to take their medication.

Telephone calls are also being used by some hospitals to check-up on patients **after discharge** to see whether a follow-up outpatient visit is really necessary. Similarly, some departments provide the number of a support line to phone if there appear to be any complications, or even if there are just questions, after the patient has returned home. All these arrangements can save unnecessary outpatient visits.

2.3.2.2 Sensors, Detectors and Alarms

Pressure pads can be used to switch on lights when a person gets out of bed. The pads can be used to sense either when they step on the floor or the reduced pressure on the bed. Whichever method is chosen, activating a light can prevent a fall. It is also possible to switch on a series of lights to guide the person to the toilet, for example.

Those who are thought to be at risk of falling can be given a **fall detector** which will automatically raise an alert in the event of an apparent accident so that help can be summoned quickly. This is important as the longer a person remains on the ground, the harder the recovery and the more care required.

Some local authorities are already giving “panic button” **alarms** to all those over a critical age or to the “frail elderly” as a matter of course. There is a telephone or wireless connection to a monitoring centre so that, when the button is pressed, help can be alerted. In some cases the monitoring centre first calls the person who pressed the alarm to find out what help is required. This sort of alarm can cover a wider range of incidents than the fall detector but usually requires the affected person to activate it. The monitoring centres are usually set up by local authority social services departments and cannot provide clinical advice directly.

Some **electronic tagging** devices are being developed to keep track of patients who suffer from confusion or related conditions so that they do not get lost if they wander too far from home. Sensors can be fitted to external doors to detect whether a person may be leaving a building. These can also be used to detect intruders. Sensors fitted on internal doors can be used to monitor movement or otherwise.

Movement, or its absence, of occupants can also be monitored with PIR (passive infra-red) sensors. In addition, these can be used for intruder detection.

Detectors or sensors also exist for:

- heat and/or smoke
- flooding
- low temperature to guard against hypothermia
- gas (for carbon monoxide and/or natural gas). These can be coupled to gas shut-off valves in case an appliance has been switched on but not lit.

2.3.2.3 Intelligent Homes

The **intelligent home** is a more comprehensive combination of sensors, detectors and alarms. Detectors can be positioned at various places around the home (such as the bed, the toilet and the refrigerator) to detect variations from the expected pattern of behaviour. Any significant variation can be picked up by the monitoring station which, in turn, can initiate appropriate action to ascertain the reason. In one trial, involving collaboration between BT and Anchor Trust, the “expected patterns” were personalised to each individual¹.

2.3.2.4 Monitors

There is now a wide range of **monitors** that can be linked to the individual rather than their environment to measure or monitor such vital signs as heart rate and blood pressure. Other devices can keep track of less critical measurements such as weight or number of steps walked. All these devices come with a wide range of functionality (and cost).

- The simplest display a reading which users can, if they choose to, make a note of.
- Some devices, for example certain blood pressure monitors, have memories which can be used to recall the last few readings (with the time and date in some equipment). To retain more than a few readings, the user still has to log them.
- At the next level of sophistication, users have equipment to key in the reading(s) from one or more monitoring or measuring devices. These readings are subsequently transmitted to a monitoring centre. Such devices, however, rely on the user remembering to enter the data and there is a risk of incorrect data entry.
- Increasing numbers of devices can transmit readings without the user having to record them. Depending on the device, transmission can be direct to a monitoring centre (normally over a standard telephone line) or to a local base station in the home. The base station in turn transmits the readings from one or more devices to a monitoring centre. There are now devices that can take an ECG (electrocardiogram) and transmit the patterns using a mobile phone.
- Some devices can be worn (like intelligent clothing) to provide continuous monitoring. Readings may be transmitted as they are collected or stored and then sent in suitable batches.

A common attribute of all these is that the users become more aware of their own health conditions and they support self-help. Currently, most of the devices which transmit readings do so by connecting to a dedicated monitoring centre provided specifically for one type of equipment or by the device manufacturer. However, some sharing (or even use of NHS Direct facilities) should be possible in the future.

¹ Exploring Technologies for Independent Living for Older People

A report on the Anchor Trust/BT Telecare Research Project

Jeremy Porteus and Simon Brownsell

ISBN 0906178 56 8

http://www.anchor.org.uk/publications_pdfs/exploring-technologies.pdf

2.3.2.5 Virtual Visiting

Virtual visiting requires rather more technology, including a camera in the patient/client's home (a video phone might suffice). It can be used by district nurses to talk to all their patients before going to visit any of them. The nurses can then decide priorities and which visits can be deferred. Virtual visiting has been used in the United States using cable television facilities. The same links are also used by the patients to talk to each other! This has a direct benefit as it helps to reduce social isolation.

As part of a European Union project, the spinal injuries unit in Salisbury is using virtual visiting to monitor patients, for up to 6 months after discharge, as a way of reducing the length of hospital stays.

A remote monitoring example to support self care in practice

In March 2005 *E-Health Insider* reported¹ that Kent County Council:

"... is pioneering the use of telecare at HomeBridge, a joint health, housing and social services project in Ashford that provides recuperative care for older people who have been discharged from hospital but are not ready to return home. The project's seven bungalows have been upgraded to the latest Tunstall telecare overlay which allows staff to use remote detectors to monitor clients for falls or changes in daily routines.

Housing manager Richard Robinson said: "It's aimed at preventing readmission to hospital and gives an opportunity for clients to use equipment and realise that with the right support they can use it and can live independently."

2.3.3 Impact and Implications

In the places where these services have been implemented, they have had a significant beneficial impact on patients and carers. They have also provided benefits for healthcare professionals and resulted in service improvements as well as some savings. Across the range of applications, the benefits realised include:

- allowing people to remain at home and maintain their independence
- reducing stress for patients, carers and healthcare professionals
- supporting self-help and better understanding of their health and associated risks, by patients and carers - often leading to less forgotten medication
- fewer emergency or unscheduled hospital admissions
- earlier discharge from hospital
- fewer outpatient visits and less in-hospital testing
- speedier (and more appropriate) response to serious problems
- better use of health and care professionals time.

Unfortunately, these benefits are not being achieved universally as the implementation of these applications is usually very localised. For all these benefits to be fully realised, all relevant organisations in a local care community need to work closely together to provide seamless care.

A few of the devices are commercially available to all citizens and some applications need only a telephone, digital TV or PC for access. However, many applications are dependent on the enthusiasm, will and budget of GPs, PCTs, hospitals or local

¹ www.ehiprimarycare.com/news/item.cfm?ID=1085

authorities. In the majority of cases, at least two of these need to co-operate to provide the service and inter-organisation communication is often difficult. Further potential players in the provision of devices and services are charities, private healthcare providers and the device suppliers.

As well as healthcare professionals having to re-think the services provided, clinicians have to accept different ways of working. In addition, citizens must understand and accept not only changes in the patient/clinician relationship but also their own responsibilities for self-care. In particular, patients have to recognise that the most appropriate clinician may not be their own doctor (even if he or she is available). With a shared record accessible to a group of clinicians, a number of them can provide appropriate advice, treatment or triage to the appropriate service.

In some cases benefits are only realised if the service is provided soon enough (for instance before the fall) and currently it is often difficult to establish who is at risk. This suggests that assessment will have to be improved if we are to make the best and most cost effective use of certain devices and applications.

2.3.4 Provision of Services

Costs for applying technology which can reduce/delay the need for healthcare or avert loss of independence vary widely. Pedometers start at £1.99 but systems requiring local hardware connected to a monitoring centre can cost a considerable sum to set up and implement. However, the running cost of systems connected to a monitoring centre is of the order of £2 per person per day for 500 clients. Such costs would reduce as the number of clients (and services) supported by a single monitoring centre increased.

One of the reasons for delay in provision of these services is the “who should pay?” issue. Initial set-up costs (devices and probably communication links together with those relating to a new or existing monitoring centre) could be met by health or social care services. However, as well as managing and maintaining the service, there are additional running costs which may include the involvement of clinicians in primary or secondary care.

In some localities, a **Single Assessment**, sharing information between health and social care workers is being used as one step towards some rationalisation. Technology is being used to record and share this single assessment electronically.

A further step towards rationalisation is the **shared device stock** (or even a common store for devices) being pioneered by some social services departments and health communities. Initially these will apply to non-electronic aids, such as those for mobility, but could easily be extended to a variety of alarms and other devices.

In the interest of demonstrating their devices, several suppliers have set up pilots with PCTs or hospital departments, often with a dedicated monitoring centre. A number of these could share a common monitoring centre, which could be an extension of the NHS Direct services.

A few devices, such as monitors, are available to the public but it is difficult for an individual to connect to a service independently.

2.3.5 Comment and Suggestions

Devices and applications are available and have been demonstrated to be of benefit to patients (and often the wider population) and to care providers. The next step would seem to be to get these services more widely available.

The drivers for wider use could be any (or some - working together) of the following:

- patients, carers or citizens
- GPs, PCTs, hospitals or Strategic Health Authorities
- social services

- national initiatives
- charities like Help the Aged
- private health care providers
- suppliers of devices
- providers of monitoring centres.

Some changes can be introduced locally by changing procedures in the surgery.

Wider publicity, both of what has been done and what is available, is needed. In some cases alternative devices need to be evaluated and possibly "kite marked".

NHS Direct could become the recognised "gateway/gatekeeper" for all other health services. Its existing call centres could be extended to accept electronic input from home devices and to monitor this data and even handle alarms.

If higher priority were given to this area of e-Health, there could be a significant reduction in demand for other healthcare services.

2.4 Hospital and Specialist Care

2.4.1 Urgent and Emergency Care

The National Programme for IT (NPfIT) will furnish clinicians with two important tools which should enable improvements to be made in the delivery of healthcare in many situations. These are the shared EPR (Electronic Patient Record) and PACS (Picture Archiving and Communications System).

The advantages of access to a health community-wide PACS system have been described in some detail in a report¹ prepared by the Telemedicine Alliance for the (then) North-West Regional Office. Of particular importance is the facility PACS should give to enable rapid reading of X-rays by a radiologist or by a specialist clinician in the case, for example, of head injuries. This should allow services to be redesigned to improve decision making and reduce errors in Accident and Emergency departments as well as avoiding unnecessary transfers or re-attendances by patients.

Immediate care by paramedics, or other healthcare professionals in an emergency should be improved by making available interactive protocols and decision support systems to wherever the patient is. These can be designed to incorporate the collection of physiological measurements including - as appropriate - ECG (electrocardiograms), oximetry, spirometry, pulse, temperature, blood pressure and blood sugar levels. The range will increase as near patient testing becomes more widespread and sophisticated.

Information collected in this way can then be transmitted from the ambulance or patient's home to a trauma centre, special unit or even an on-call specialist at home. Photographs of the patient or trauma scenes can be incorporated. All this should enable better decisions to be made about the future care of the patient including whether one of the following is appropriate:

- Care at home
- Transfer or referral to a local minor injuries unit
- Transfer to trauma centre

¹ John Navein & David Blake "Community Picture Archiving and Communications System (CPACS) in the North West, A Big Idea that Might Just Work" a report for the North West Regional Office by The Telemedicine Alliance Ltd. November 2001 Copies available from study@tehip.org.uk

- Transfer to a specialist unit such as a Coronary Care Unit (CCU) in a local DGH (District General Hospital)
- Transfer to a specialist tertiary facility (e.g. neurosurgery or burns).

If a transfer is involved, the information can also enable the receiving unit to be fully prepared to take the patient.

A few examples of how these applications might be applied in particular situations follow.

- **Acute Coronary Care**
Transmission of patient history from ambulance to an A&E (Accident and Emergency) unit or CCU to allow a thrombolytic¹ drug such as streptokinase to be given immediately on arrival or to support its administration either en route or at home.
- **Head Injuries**
CT scans to an on-call neurosurgeon to aid diagnosis and decide on treatment options. Support remote referral of patients to specialist units for decision on transfer or management.
- **Burns, Spinal and Chest Injuries**
Access with images, physiological data and, potentially, video conferencing to support decisions about the urgency of transfer or local management of patients.
- **Psychiatric emergencies**
Video conferencing links to police stations and prisons to support local staff in decision making about diagnosis and management.
- **Minor injuries**
Supporting staff in minor injuries units, walk in centres and other open access situations with video conferencing links.

2.4.2 Scheduled care

The ability to use the transfer of images, shared records and video conferencing could also be valuable in the more routine situations.

There have been significant trials of the use of video conferencing for out-patient attendances. Though these trials have been generally satisfactory from the clinical perspective, there are doubts about the economics. In certain circumstances, for example where it is very difficult for the patient and/or very time consuming for the clinician to travel for a face to face session, video conferencing is clearly justified. Providing genetic outpatient services to the whole of Wales in this way is clearly very effective. A similar example, though barely used in England, is the provision of services to prisoners, especially those in high security establishments.

For certain conditions store and forward referrals can prove very effective if they are integrated into a suitable care pathway. Dermatology is the obvious example where the transfer of images can help to provide a better service. Teledermatology has, however, only proved effective where the service has been reorganised to make best use of the potential.

¹ Thrombolytic drugs are used to dissolve clots in people suffering from heart attacks. The drugs help by opening blocked coronary arteries and returning blood to the part of the heart that has been affected in the attack. Thrombolytic treatment should be given as soon as possible and the NHS has targets for "call-to-needle" times.

3 The Impact on Patients and Clinicians

3.1 Introduction

The previous section looked at how e-Health and Assistive Technologies can be used in particular settings as well as how various aspects of care could benefit from them.

This section considers their impact on patients and clinicians with particular reference to real-life examples. It examines a range of issues including how care pathways can be improved.

3.2 Long Term Conditions

Long term disabilities, chronic disease and the expert patient are overlapping terms used in connection with those people, who may be young or old, whose clinical condition is such that they will require care of some description for a long period, if not all, of their lives.

The problems facing these patients and the impact on the health and social care services are summarised in the Department of Health publication *Improving Care: Improving Lives - Supporting People with Long term Conditions*¹ as follows.

- Seventeen and a half million people in this country report a long term condition (such as diabetes, asthma or arthritis).
- For some people, especially the elderly and those with more than one condition, discomfort and stress is an everyday reality.
- The impact on the NHS and social care for supporting people with long term conditions is significant.
- Care for many people with long term conditions has traditionally been reactive, unplanned and episodic. This has resulted in heavy use of secondary care services.
- Just 5% of inpatients, many with a long term condition, account for 42% of all acute bed days.
- Only about 50% of medicines are taken as prescribed.

Most people with chronic conditions such as diabetes, congestive heart failure, asthma, and depression are managed in the primary care setting. NHS consultants have traditionally confined their roles to patients who are referred to outpatient clinics by general practitioners. Such patients usually have the most severe and complex problems.

Effective care teams for chronic illness must be able to cross practice or organisational boundaries², but the current organisational structure of the NHS does not provide many incentives to develop such linkages. General practitioners refer patients they cannot manage and hospitals are funded on the basis of referrals. Time

¹ Can be browsed or downloaded from [this page](#) of the Department of Health website.

² Role of specialists in common chronic diseases. Gask L. BMJ 2005;651-653

spent on joint work with primary care is not accounted for. To ensure that all patients get the best treatment, the role of consultants needs to change so that their specialist knowledge is more available to everyone dealing with chronic disease.

The following shows a possible means by which e-Health could support the patient journey.

The patient journey: how will e-Health support this?

- A 55 year old male patient attends his GP with specific symptoms that suggest, for example, Diabetes. The patient also brings along information gleaned via NHS Direct Online or digital TV or other web sites.
- Tests are taken and sent for analysis. Results are returned electronically and downloaded directly to the patient's record.
- An alert system associated with the electronic record identifies an abnormal result that is flagged for easy recognition by the GP or specialist nurse.
- GP introduces the patient to the Clinical Nurse Specialist who works in both the acute hospital and the community-based clinics that are video linked, when needed, to the hospital specialist.
- Patient is given advice on his medication, diet and self-help groups.
- In addition websites such as NHS Direct Online are recommended as a way of maintaining his knowledge base.
- Instructions are given on how to monitor and record medication and symptoms and input these into his personal health record (possibly via NHS Direct HealthSpace).
- Ongoing remote monitoring as described in the models below.
- Regular checks arranged with nurse via telephone, text phone or email according to patient's preference.

The following is an example of e-Health being used to care for diabetic patients.

A Diabetes example in practice:

In 1999 Salford Royal Hospitals NHS Trust and Salford Primary Care Trust approached BT seeking a technology partner to develop and evaluate an information and communications technology contact centre solution to facilitate better management of Type II Diabetes. The Diabetes Specialist team in Salford devised a script covering all aspects of a typical consultation seeking to instigate improved disease self-management between a patient and a Diabetes nurse.

This project is led by Jean Taylor, a Diabetic Specialist Nurse with over 16 years experience. BT software engineers wrote the script into a triage programme that could be used by call operatives, or 'telecarers', to interview Type II Diabetes patients. Upon completing the interview, telecarers could ascertain blood-sugar levels and offer information about the disease or advice about management – all written into the programme. Alternatively, patients could be referred – via the software and an ISDN connection – to a Diabetes Specialist nurse and follow-up calls arranged. The solution was integrated into Salford Royal's existing ICT systems so that telecarers could gain access to the district diabetes information system.

The trial commenced in March 2002 and completed its initial stage in June

2003. The results have been exceptionally positive in terms of all the objectives set. HbA1c was reduced by 0.4% in many people with diabetes who had moderate or poor control.

Patient surveys revealed high levels of satisfaction with the treatment – more than 90% either strongly agreed or agreed with the alternative intervention regime provided by Proactive Contact Centre Treatment Support (PACCTS). Forty-five per cent of trialists, when asked if they'd rather see a healthcare professional face-to-face, disagreed.

BT Carecall

info@bthealth.com

3.2.1 Remote Monitoring

As described in the section on [Monitoring Clinical Signs and Symptoms](#), new technologies allow patients to be monitored at a distance for a number of signs and symptoms that would indicate that an intervention in their care is needed. As this form of monitoring can be undertaken at frequent intervals or, in some cases, continuously it is possible to detect need almost immediately. Remote monitoring requires the patient to have access to, or be “wired” with, a monitoring device. This must be capable of measuring and recording the changes that will demonstrate that there is a problem and might take the form of:

- blood pressure, heart rate and other vital clinical signs
- changes to a normal routine such as a failure to get out of bed or to take medicines at the correct times.

A remote monitoring example in practice

In March 2005 *E-Health Insider*¹ reported on the innovative approach taken by Kent County Council in launching a series of telehealth and telecare initiatives.

The countywide Kent Telehealth scheme is a partnership between Viterion in the USA and Kent County Council. The Council has provided £1m funding for the pilot project to support 275 people with chronic diseases in their own homes.

Each person will be provided with a touch screen, video link-up and digital cameras and will be able to self-assess and monitor their chronic condition and then communicate with health and social care professionals via a telephone line to a secure web-based facility. Conditions such as chronic obstructive pulmonary disease, diabetes and asthma, congestive heart failure and depression will be supported by the scheme. According to Viterion such systems in the US have cut hospital admissions by half and meant reduced travelling time and costs for patients.

¹ www.ehiprimarycare.com/news/item.cfm?ID=1085

3.2.2 Regimen Change

Under present and usual circumstances, when a patient is prescribed medication or a programme of treatment, the hospital consultant will often arrange a further appointment to monitor and review progress.

For the patient this requires:

- transport to be arranged which, for the elderly or infirm, is likely to be an ambulance
- a journey that may be lengthy, time consuming and uncomfortable
- a wait to be seen in a busy and possibly uncomfortable outpatient department
- making arrangements for food and drink when the whole episode extends over usual meal times
- the return journey with the same problems as before.

For the NHS this means:

- an ambulance or car booking
- space in a general or speciality outpatient department
- medical and nursing staff to attend the clinic
- access to laboratory and pharmacy services
- cost and logistics issues in managing all of the above
- opportunity lost to use any or all of the resources for other patients and services for whom telemedicine is not a option.

Where remote monitoring can be used effectively to manage a patient's on-going care, many of the above can be avoided. The patient pathway could change to the following:

- Patient is provided with a monitoring system particular to own needs
- Patient and carers are taught to use the monitor to relay information on clinical status at regular intervals. The information may be sent to the monitoring centre. Alternatively it may be sent directly to a GP, specialist nurse or consultant as required.
- Where the monitored signs suggest that a change to a drug or lifestyle regimen is needed, this information is relayed to the patient or carer as preferred and previously agreed.
- If it is decided that a face to face appointment is needed, this could follow the traditional model or be undertaken via video link, with the patient supported at home or in the GP practice by a specialist nurse.

For the patient and carer this model removes many, if not all, of the disruptive and uncomfortable aspects of the present system of care. It also provides the patient with a treatment choice. Whilst the Government's choice agenda does not at present stretch to the provision of home monitoring, this is unlikely to be the case for the future. Much will depend on widening the use and experience of the technology together with marketing its benefits to patients and care providers alike.

As we found during the Study, however, progress remains slow. There are just a few successful small projects. These are led by local enthusiasts but are still failing to be adopted either locally in other specialities or within the same clinical speciality in another locality.

For the NHS remote monitoring could replace many of the most costly elements of care (ambulance journey, outpatient space, staff) with the cost of the monitor itself and of the service required to respond. As technology improves and its use expands, the purchase or rental costs of monitoring devices will reduce. Where 24 hour response services such as NHS Direct are in place for one purpose, the addition of another service should be possible at marginal additional cost.

It is important, of course, not to underestimate either the difficulty of making such a radical change or the impact it will have on individual patients and service providers. Significant concerns about initiating and managing change in the NHS were raised in the [Validation Workshop](#).

3.3 Supporting self care

3.3.1 Access to information

(See also the earlier sub-sections on [NHS Direct](#) and [Web Sites](#)).

Information is vital to clinical staff as well as patients and their carers. Up until the recent past many people assumed that their doctor or nurse would know everything that there was to know about their diseases or medical conditions. Whilst some people had access to medical books or a home encyclopaedia, most chose not to use them to confer with their doctor. Indeed many people appeared to have no desire to know more than doctors told them, trusting implicitly in the profession's knowledge and skills.

Widening access to the internet, whether at home or another location such as a local library, has made it possible for almost everyone to access information related to their health and clinical condition. Details of services provided both locally and throughout the country are also available. It will soon be possible to have details of mortality and morbidity statistics at hospital or specialty level and possibly down to individual doctor level.

This degree of access is intended to support the Choice Agenda for patients but there is much debate within the NHS and elsewhere, including in the media, about whether this is a good or bad move. At the [Validation Workshop](#) a clear response was received that there is a need to ensure that anyone needing to access information, related to their health and service provision, is educated in how to access and then in how to understand and assess the validity of the information that they find.

3.3.2 Virtual visiting, monitoring and support

Patients and NHS staff are accustomed to using and providing services in a traditional manner that has, for the most part, worked well for many years. GPs hold surgeries in their offices and the patients make an appointment to attend for a consultation. If patients are too unwell to attend the surgery, the doctors take their care to the patients with a home visit.

For most patients this mode of working is, and will continue to be, the most appropriate. This will be especially so where patients are also encouraged and educated to use new information sources prior to attending the surgery for further advice and, if needed, a specialist referral.

However for patients whose condition is of a chronic nature (examples include diabetes, heart disease, COPD, mental illness or a combination of any these with old age) there are now opportunities to provide ongoing supervision and care without the need for the patient to attend the surgery.

Using video conferencing, either over the internet or via a video phone, the patient or carer can have a "face to face" discussion with their nominated clinical lead, who might be the GP, a clinical nurse specialist or a district nurse.

This support can be extended to include relatives or neighbours with access to the equipment, none of which is excessively expensive and might appropriately be purchased or hired by the PCT. Expenditure on this is easily outweighed by savings in travel time and costs.

The New Technology in Elderly Care (NTEC) Project¹, led by Dr Frank Miskelly, is a joint venture between London Borough of Ealing, Ealing Family Housing Association, Hammersmith Hospitals Trust and Imperial College London. The aim of the project is to evaluate the benefits of new technology aids and devices for older people living in the community. For frail elderly living in hospitals, residential and nursing homes or their own homes, the focus is on preventing or detecting:

- falls
- wandering
- failure to cope.

The aids and devices being evaluated include:

- video-monitoring systems
- fall detectors
- bed monitors
- chair monitors
- health monitors
- electronic tagging.

Some devices have shown substantial benefits in the care of older people while others have been less successful. Further evaluation is ongoing and new devices and technologies, including automatic fall detection systems, are being investigated.

Dr Miskelly has used video links to allow an elderly person in her home to communicate with her son as well as the hospital base. A video², made to demonstrate the new way of working, shows clearly that the elderly person is comfortable with the equipment and feels safer for being able to see as well as hear her son or nurse.

The cost of the equipment for the trial was £800 and this was funded by the Modernisation Agency.

3.3.3 Empowering patients

Self care was highlighted in the NHS Plan as one of the key building blocks for a patient-centred health service. More recently self care featured as a key component of the model for Supporting People with Long Term Conditions. Research shows that supporting self care can improve health outcomes, increase patient satisfaction and help in deploying the biggest collaborative resource available to the NHS and social care – patients and the public.

Helping people self care represents an exciting opportunity and challenge for the NHS and social care services to empower patients to take more control over their lives.

Self Care – A Real Choice

Self Care Support – A Practical Option January 2005

www.dh.gov.uk/SelfCare

The expression “empowering patients” has become quite commonplace within the NHS. There are some examples within the Service where the concept is being taken seriously but, as yet, it does not appear to be fully embedded within the culture.

¹ <http://ntec.org.uk/>

² <http://ntec.org.uk/videomonitoring.mov>

Many Government policies are, however, geared to ensuring that staff take heed of this very worthy ideal.

The *Expert Patient: A New Approach to Chronic Disease Management for the 21st Century*¹, published in 2001, recognised the need to empower patients with chronic conditions. Many of these patients are acknowledged to know as much about their own illnesses as their doctors.

Research and practical experience in North America and Britain are showing that today's patients with chronic diseases need not be mere recipients of care. They can become key decision-makers in the treatment process. By ensuring that knowledge of their condition is developed to a point where they are empowered to take some responsibility for its management and work in partnership with their health and social care providers, patients can be given greater control over their lives. Self-management programmes can be specifically designed to reduce the severity of symptoms and improve confidence, resourcefulness and self-efficacy.

To enable people to achieve good quality of life despite having a chronic disease is the fundamental goal of the change being sought by this report.

The Expert Patient:

A New Approach to Chronic Disease Management for the 21st Century

The Policy describes the concept well and outlines some ideas on how patients with chronic disease might be empowered. Since its publication new and developing technologies have become available that offer new ways of empowering patients, enabling them to take greater control over their lives and illness. Many have been mentioned in other sections of this Report but are summarised here for ease of reference:

- Remote monitoring of clinical symptoms, ensuring early notification of need for professional clinical support
- Remote monitoring of activities of daily living ensuring swift responses to falls, failure to take medication or failure to get in or out of bed at regular times
- Virtual visiting via video links to relatives/carers or professional staff
- Establishing "chat rooms" for mutual support
- Education in access to legitimate websites specific to their illness.

The list is not exhaustive. It would be truly in the spirit of empowering patients, especially those younger patients who might already be using computers and mobile phones routinely in their daily lives, if they were to be included at an early stage by manufacturers and NHS staff in developing new ways of using technology to support their needs - both clinical and domestic.

Within the primary care setting Dr Cecilia Pyper, at Bury Knowle Health Centre in Oxford, established a pilot project in 2001² that has encouraged patients of all ages to view their health care record held on the computer in the practice. The early results have been encouraging³ and demonstrate that many patients valued the opportunity to see what is written about them. Some patients reported recording errors which

¹ Available from [this page](#) of the Department of Health website

² www.nhsia.nhs.uk/def/pages/pr/06032001.asp

³ Pyper C, Amery J, Watson M, Crook C.

Access to electronic health records in primary care - a survey of patients' views.

Med Sci Monit. 2004 Nov;10(11):SR17-22. Epub 2004 Oct 26

were then corrected by the designated member of health centre staff. There are similar plans for NHS Direct Online to have a HealthSpace section for individuals to keep their personal health record for access wherever and whenever they find the need.

Choose and Book, where patients will have the opportunity to decide when and where to have their hospital appointment, is another example of patient empowerment. Initially access to hospital appointments will be via the GP surgery but there will be future opportunities to extend this to the NHS Direct Online site, once the necessary NPfIT infrastructure is in place.

3.4 An Alternative Model of Care

During the course of the Study we had the opportunity to interview Simon Dodds, a Vascular Surgeon, of Good Hope Hospital in Birmingham who has developed an alternative model of care for vascular patients with leg ulcers. His new model has succeeded in delivering, to the patient attending his leg ulcer outpatient clinic, the right care by the right professional at the right time. To do this has necessitated the development of a shared electronic patient record and a software program that books and tracks the patient at all stages in the outpatient journey. The project is summarised by the team below.

On the dawn of the new millennium, Good Hope Hospital (GHH) embarked on an ambitious project to completely re-design the delivery of care to patients with lower limb ulceration. In July 2004 the completed project was awarded the NHS Innovation Award for Service Delivery at the Health and Social Care Awards in London. The GHH LUTM Project therefore stands as a landmark example of how community-hospital collaboration, care process re-design and the use of information technology can be employed to deliver better outcomes for patients at a lower cost to society.

This document is intended to provide community and hospital leg ulcer specialists with all the information required to replicate this work and to plan and build a virtual multidisciplinary team that combines the community and hospital teams and deliver optimised care to this vulnerable group of patients.

The patient-centred philosophy supported by the latest information technology is explained and justified. Robust evidence that this model works is presented together with a cost analysis based on this evidence that supports the use of this model of care. Finally, the enabling technology, a shared electronic patient record system, is defined in enough technical detail for IM&T specialists to assess its robustness, security and ease of implementation.

To plan and deliver an implementation of this model of care will require faith, enthusiasm, determination and a team that comprises:

- Community nurse specialists in leg ulcer care
- Primary Care Trust commissioning team
- Primary Care Trust IM&T department
- Acute Hospital Trust leg ulcer care specialists
- Acute Hospital Trust commissioning team
- Acute Hospital Trust IM&T department.

The crucial factor in succeeding is to have the vision and courage to challenge established working practices and to adopt new technology ... but the rewards are well worth the effort.

This highly successful project highlighted a number of issues:

1. Where they exist successful telemedicine projects are initiated and developed by local enthusiasts.
2. Despite obvious success it is still left to individual clinicians locally to decide whether or not to change their own practice and adopt a new way of working.
3. Spreading the word and sharing good practice, either within the clinical speciality nationally or to other specialities within the local area, is still left to the project initiator and is generally via the conventional routes of publication in professional journals and presentation, when asked, at suitable conferences.
4. Widespread adoption has been very slow if not non-existent.

3.5 Further Examples Relating to Specific Diseases

3.5.1 Chronic Obstructive Pulmonary Disease (COPD)

Chronic obstructive pulmonary disease (COPD) is the name for a collection of lung diseases including chronic bronchitis, emphysema and chronic obstructive airways disease, all of which can occur together. COPD is one of the most common respiratory diseases in the UK. It causes 300,000 deaths a year, which is about 20 times more than asthma. COPD occurs as a result of damage to the lungs. The main result of having damaged lungs, usually through smoking, is difficulty with breathing. These breathing problems gradually get worse and worse, resulting in decreased quality of life and even heart failure. The symptoms of COPD can appear similar to those of asthma. However, whereas asthma can be controlled with treatment, COPD causes permanent damage to the lungs, from which they cannot recover.

NHS Direct Online Health Encyclopaedia

The very nature of COPD, depending on its severity, means that patients will find it difficult to breathe under even fairly small amounts of activity. Patients may need regular monitoring of their illness and changes to their treatment regimens. To submit patients, at frequent intervals, to having to travel to the GP practice or specialist in hospital in order to undertake these reviews is likely to put significant additional strain onto both the patients and their carers.

With video phones, cameras and remote monitoring equipment this no longer needs to be the case. Such equipment, when supported by an electronic patient record and remote monitoring tools, can replace the need for patients to do the travelling. They can be taught to self care supported by the knowledge that the tools are monitoring their conditions and transmitting them constantly. If a change in condition dictates that help is needed, patients can be assured that the response will be swift.

3.5.2 Heart failure

Heart failure does not mean that the heart has stopped or that it is about to do so. Instead it is when the heart cannot pump blood around the body

efficiently. This means that the tissue of the body is not getting enough oxygen and nutrients to enable it to function properly. In addition, waste materials cannot be transported properly to the lungs and kidneys for excretion. The result is that fluid builds up in the lungs and tissue.

NHS Direct Online Health Encyclopaedia

As described for COPD, enabling patients to remain at home, having their vital clinical signs monitored remotely, reduces the strain on both relatives and carers. Given that COPD and heart failure make up a significant proportion of hospital outpatient and GP practice visits, the benefits of changing to this method of support - for even a small percentage of patients - could be enormous in terms of freed space, staff time and ambulance journeys.

3.5.3 Glaucoma

Glaucoma is the name of a group of eye diseases that affects vision. If left untreated glaucoma can eventually cause blindness. Glaucoma is more common in old age, and happens when the optic nerve in the eye is damaged.

Regular eye check ups are very important to detect glaucoma early on. This is particularly important if you are over 40, or have a family history of glaucoma.

By the age of 70, about one person in ten has significantly raised eye pressure. Chronic (acute angle) glaucoma also runs in families and is more likely to occur in relatives of people with the disease.

People of Afro-Caribbean origin, very short sighted people and those with diabetes are at a higher risk of developing open angle glaucoma.

The complication of undetected and untreated glaucoma is blindness. Glaucoma is one of the most common reasons for people needing to register as blind. It is only the most common type of glaucoma – open angle glaucoma – that is likely to remain undetected to a late stage

NHS Direct Online Health Encyclopaedia

Community opticians or GPs equipped with the ability to send moving or still images of patients' eyes can be given advice by hospital ophthalmologists.

3.6 Summary of e-Health Interventions for Chronic Conditions

The following shows examples of where e-Health can make a difference to the management of long term or chronic conditions.

Target	e-Health intervention	Mechanism	Linked to	Benefits
<ul style="list-style-type: none"> Health Promotion 	Access to advice via the Internet, Digital TV and radio	<ul style="list-style-type: none"> NHS and other accredited web sites GP Practice advice lines 	<ul style="list-style-type: none"> Television/radio programmes 	<ul style="list-style-type: none"> Extends access to information widely
<ul style="list-style-type: none"> New patients/patients with chronic conditions The elderly 	Access to self help groups and support	<ul style="list-style-type: none"> Web sites Video conferencing 	<ul style="list-style-type: none"> Other patients in similar situation Professionals for advice/ treatment updates 	<ul style="list-style-type: none"> Empowers patient Supports self care for as long as practicable Reduces stress for family carers Reduces need for hospital admission Extends expert patient experience
<ul style="list-style-type: none"> Patients with chronic conditions The elderly 	Remote monitoring of activities of daily living	<ul style="list-style-type: none"> Video monitoring Falls monitoring and management by alarm system 	<ul style="list-style-type: none"> Professional carers Central monitoring unit 	All above plus: <ul style="list-style-type: none"> Responding to divergence from norms either remotely by adjusting treatment regimen or by activating emergency care
<ul style="list-style-type: none"> At risk patients Patients with Chronic conditions 	Remote monitoring of: <ul style="list-style-type: none"> clinical readings such as insulin levels, blood pressure, cardiac activity prenatal at risk mother or baby 	<ul style="list-style-type: none"> Phone or computer links 	<ul style="list-style-type: none"> Hospital or GP 	As above
<ul style="list-style-type: none"> The elderly Physically and mentally disabled 	Virtual visiting	<ul style="list-style-type: none"> Video monitoring 	<ul style="list-style-type: none"> Professional carers and extended family Central monitoring and response team 	<ul style="list-style-type: none"> Empowers patient Supports self care for as long as practicable Reduces stress for family carers Reduces need for hospital admission

4 Current Position and Issues

4.1 Introduction

This section reviews the current position with respect to the implementation of e-Health and Assistive Technologies. It also discusses related matters such as levels of awareness and availability of information.

It then considers a range of issues, as perceived by those contributing to the study, that have been barriers to adoption in the past or that need to be addressed in order for progress to be made. Some sources of concern, related to future plans and expected developments, are also covered.

4.2 General Awareness

There is no doubt that there is now very much greater awareness of telemedicine, telecare and e-Health applications amongst the general public and the healthcare community than there was when we published our first report¹. This was borne out in the findings from the questionnaires and interviews. This impression is also confirmed by the increased coverage of these subjects in the general and specialist press. The frequency of research studies and papers in academic journals on these topics is also rising.

The general improved awareness within the NHS is certainly matched at government and parliamentary level. In addition to material from the Department of Health, the number of official publications that point to the potential of e-Health and Assistive Technologies has been increasing. Several of these suggest strategies or give advice on implementation. Recent examples (newest first) are:

- Health Select Committee, *The Use of New Medical Technologies within the NHS*, Fifth Report of Session 2004–05²
- British Medical Association, *Healthcare in a rural setting*, January 2005³:
“The use of telemedicine should be encouraged. It gives increased flexibility to healthcare service providers and allows them to expand the scope and quality of services.”
- The Audit Commission, *Older people - implementing telecare*, July 2004⁴
- The Audit Commission, *Assistive Technology: Independence and Well-being 4*, February 2004⁵

¹ Jardine I, Clough K, et al *Telemedicine and Telecare : Impact on Healthcare*, published by the Institute of Health Service Management (IHSM), May 1998. Copies available from study@tehip.org.uk

² html: www.publications.parliament.uk/pa/cm200405/cmselect/cmhealth/398/39802.htm

pdf: www.publications.parliament.uk/pa/cm200405/cmselect/cmhealth/398/398i.pdf

³ html: www.bma.org.uk/ap.nsf/Content/healthcarerural

pdf: [www.bma.org.uk/ap.nsf/Content/healthcarerural/\\$file/rural.pdf](http://www.bma.org.uk/ap.nsf/Content/healthcarerural/$file/rural.pdf)

⁴ Available in html and pdf on [this page](#) of the Audit Commission web site

⁵ Available in html and pdf (with related documents) from:

www.audit-commission.gov.uk/olderpeople/olderpeoplereports.asp

4.3 Level of Implementation

Since the publication of our first report we have also become aware of very many more projects which have tried to use e-Health applications to improve healthcare. However the overwhelming impression is that most of these are of an ad-hoc nature, very small scale and often poorly supported. There are very few examples where there has been integration into an improved overall system that delivers better healthcare. NHS Direct is, of course, an outstanding exception to this general rule. Another exception, though on a local scale but nevertheless highly impressive, is the treatment of leg ulcers in Birmingham covered [earlier](#).

There are a few applications whose use appears to be becoming more widespread. These are:

- use of video to link minor injuries units to specialist centres
- video conferencing of MDTs (multi disciplinary teams) in Cancer networks.

A number of dermatology projects have been initiated but few have been successful¹.

4.4 Sources of Information

Although there is increasing knowledge and understanding of e-Health, there is poor appreciation in the Service of how e-Health combined with NPfIT could potentially contribute to the achievement of other goals. Perversely for a national Service, there is not a strong tradition of learning from others.

Part of the problem is that there is no consolidated source of information available on a national basis. It would appear that only a small proportion of projects is notified to TEIS - the Telemedicine and E-health Information Service² or to TIE Europe³. In addition, a fair amount of the information provided to them does not appear to have been updated for some time.

There was strong demand from those who contributed to the Study for much better sources of information for those considering the use of the technologies and applications under consideration. Included in this is a need for a single, consistent and comprehensive guide to who is doing what and where (in both health and social care).

Overall, too much of the information that is currently readily available has shortcomings – often because it is significantly out of date. The present arrangements do not support timely provision of information nor do they provide sufficient interaction.

4.5 Business Cases and Funding

There are particular difficulties in establishing a viable business case for many e-Health applications. The reasons are that:

- A relatively modest first step has to carry significant infrastructure costs that will only be justified when the service is extended.

¹ The reasons for this include pressure on clinical and technical staff to achieve other short term targets, difficulties with the use of *NHSNet* for communications, resistance to changed ways of working and perhaps most importantly failure to integrate new ways of working into an effective care pathway

² <http://www.teis.nhs.uk>

³ <http://tie.telemed.org/europe/>

- There is a lack of published evidence and experience from elsewhere.

Shortage of funds can, of course, present difficulties but sometimes, even when the initial funding is available, a project does not proceed as a result of concerns about the ongoing or revenue costs.

This can be because of difficulties in proving the potential savings. More often it seems to be caused by the challenge of identifying and then allocating the savings particularly when they lie in a number of budgets held by several different organisations. For example, implementation of a video conferencing application that could save very significant sums in clinician travel costs (and more importantly valuable clinicians' time) can be prevented because there are insufficient local funds to meet the modest call costs and there is no easy way of transferring the travel savings to the relevant budget.

It is almost inevitable that an e-Health application will involve communication between different organisations. This requires:

- acceptance of the business case from at least two, if not more, organisations
- common agreement that the project will be given priority over competing demands on resources especially the time and attention of key individuals
- the enthusiastic support of managers, clinicians and technical or ICT staff in each organisation
- the ability, as with all projects, to cope with the "political" problems and to do so simultaneously across a number of organisations.

These difficulties are exacerbated when, as is very often the case, the change will incur expenditure from increased demand in one organisation whilst providing savings in another. PCTs, in their commissioning roles, will be very important in resolving these issues. One of the major benefits of e-Health is that more patients receive treatment. This, however, can be a problem as it may increase rather than decrease costs.

4.6 NHS Policies and Strategies

4.6.1 E-Health and Assistive Technologies

The NHS - in common with health services throughout the developed world - faces significant challenges from an aging population, an increasingly demanding public and the rising costs of more sophisticated treatments. To cope with this, the service must become more efficient and many believe that one essential element in doing so will be to take advantage of the potential offered by ICT (including E-Health and Assistive Technologies). Happily, effective systems are becoming available and the cost of both computing and telecommunications is reducing.

Over the last eight years there have been a few brief references to telemedicine and telecare in a number of major policy announcements and reports from the Department of Health such as:

- *The new NHS. White Paper* - December 1997
"NHS .. will harness the enormous benefits of IT by ...developing telemedicine to ensure specialist skills are available to all parts of the country." (3.15)
- *NHS Plan* - July 2000
"all local health services will have facilities for telemedicine by 2005 allowing patients to connect with staff electronically for advice." (4.21)
- National Service Frameworks Assessment No.1: NHS Cancer Care in England and Wales: December 2001

“In order to use time and resources well, the functions, membership and timing of these MDTs may need to change depending on the type of cancer and local circumstances. Attendance by some specialists, such as pathologists and radiologists, might sensibly be limited either to certain parts of a meeting or to those meetings centred on diagnosis.

.....Attention is also needed to making these teams work more effectively. If team members are not in the same area, a tele-medicine link with consultants should be considered, as has been set up in Bronllais Hospital in Wales.”

It was only relatively recently (for example in the NHS Improvement Plan¹ issued in June 2004) that the topic started to be addressed more fully. A considerable amount of valuable guidance was published on telecare in July 2005 and this is discussed in the [Section on Support and Funding for Telecare](#).

4.6.2 NPfIT

The implementation of the National Programme for IT (NPfIT) is clearly intended to provide the infrastructure needed to deliver most of the e-Health and related applications. It is also intended, at some unspecified time in the future, to provide most of the applications themselves. Almost without exception the contributors to the Study were behind the overall objective of an integrated system to support the delivery of healthcare in all settings. Views, however, were very divided on how NPfIT would affect the ability of the NHS to exploit the potential of e-Health to improve healthcare in the short and medium term.

Some of the points made to us in the course of the Study were that:

- NPfIT will provide the necessary infrastructure so that e-Health can at last begin to fulfil its potential
- The concentration and attention on delivering the immediate targets is so intense that it will prevent any progress for a few years
- The best strategy is to put telemedicine and telecare on hold until the infrastructure that enables it to be developed is fully in place
- The programme has excluded the small innovative companies from getting their products accepted by PCTs and trusts
- The functionality to deliver e-Health applications will eventually be available so we should use interim systems to begin to support the changes in the delivery of care that will be possible
- NPfIT could fail so it is best to carry on regardless
- There is considerable scepticism that the services will be made available in patients own homes to support self-care and domiciliary care
- The provision of an integrated PACS system across the whole country will provide a major enabler and driver
- There is a concern that those designing and delivering the programme do not understand the requirements of some e-Health applications such as multi-site video conferencing and virtual visiting.

¹ *The NHS Improvement Plan: Putting people at the heart of public services* available from [this page](#) on the Department of Health website.

4.6.3 Small Projects and Strategic Approaches

We found some differences of opinion amongst our respondents about whether the most effective way to exploit e-Health was to focus on the local application of relatively small projects or to take a more strategic approach.

We consider that both approaches are essential. Small scale innovation is necessary in order to test out and demonstrate the advantages of the different ways of working that the applications enable. However they are unlikely to flourish and become widespread unless i) they are put in the context of the strategic development of health services and ii) the technical support that this requires is recognised.

4.6.4 Conflicting Priorities

There was also a general concern that NPfIT is only one of a number of initiatives to which the service has to respond. Each of these can seem to be separately initiated and performance managed in such a way that PCTs and trusts can find it difficult to respond to them in an integrated way.

In addition to the whole modernisation agenda, key initiatives that fall into this category include the:

- “10 High Impact Changes”¹
- National Service Frameworks² (NSFs)
- Choice agenda - see the Department of Health White Paper *Choosing Health*³
- Payment by Results.

A constant theme during the Study was that the close focus on meeting short term targets made it very difficult, and in some places impossible, for organisations and managers to pay attention to longer term solutions for some of the problems they were facing. There was felt to be a real danger that some targets and, even more so, Payment by Results would produce incentives that were antagonistic to using technology to enable care to be delivered in patients' own homes. These issues are discussed in greater detail below.

4.6.5 Targets

Several of the uses of e-Health that were explored in the Study had proved of direct benefit in helping to meet performance targets set by the Department of Health. Examples include:

- reengineering outpatient clinics with the use of shared records and images
- use of video conferencing to facilitate MDT meeting in cancer networks.

There is also a strong belief that there is a very significant potential in a whole range of applications that will reduce pressure and help to meet targets. These include using e-Health to:

- support minor injuries units thus relieving pressure on A & E departments
- avoid unnecessary admissions for the exacerbation of chronic illnesses such as COPD and heart failure.

¹ www.wise.nhs.uk/cmsWISE/HIC

² See [this page](#) on the Department of Health website.

³ *Choosing Health: making healthier choices easier*, Public Health White Paper. CM 6374 November 04. Available from [this page](#) on the Department of Health website.

This contrasts with the view of many of the contributors to the Study who believed that organisations and communities found it very difficult to consider innovative ways of redesigning the delivery of care unless they were specifically mandated to do so by the Department of Health and the Strategic Health Authorities.

There was concern about the effect that targets could have in focussing attention almost exclusively on the short term. To take a small example: it can even be difficult for a trust to allow a dermatologist time away from the clinic to plan, learn how to use, and test a teledermatology system, if that could threaten - even temporarily - meeting the waiting list targets.

4.6.6 Payment by Results (PbR) and Patient Choice

Payment by Results (PbR), the use of HRGs (Health Resource Groups) as the “currency” for this and practice based commissioning are being introduced. At this stage it is not clear what the effect will be. Many believe that it is likely to restrain the development of alternatives to hospital care by encouraging trusts to seek to maximise the number of admissions in an attempt to maximise their income.

However, when one considers the whole health system, the drivers and perverse incentives are much more complex. For example:

- Whilst hospitals may seek to maximise their income by encouraging admissions, PCTs and GPs will have a strong incentive to reduce expenditure by caring for patients in their own homes.
- For some conditions e-Health solutions will enable patients, GPs and PCTs to look wider than their local provider(s) for the expertise they require.
- Hospital trusts will be anxious to reduce costs and this may drive them to promote e-Health solutions which enable earlier discharge and/or reduce re-attendances.
- Hospital trusts will find that there is no advantage in adopting strategies that reduce the ability of their commissioning PCTs to either afford specialist care or to provide community service to speed discharge.

The introduction of the choice agenda will add a further dimension. As patients become more accustomed to choosing where to have treatment they are also likely to select the way they would like the care to be provided. There is significant evidence that patients welcome e-Health solutions especially where this enables them to maintain their independence.

This is a very complex situation and one where it is not easy to see which way the incentives will work either in the medium or long term. As with any system of this sort, the devil will lie in the detail. The implications of the new system do need to be carefully thought through and mapped out. The practical effect will also have to be monitored.

Despite these complications we believe that the net effect will be an increased drive towards care being delivered out of hospital and hence the development of technology that will support those moves.

4.7 Commercial Considerations

Small suppliers find it very difficult to sell their products into the NHS. From their point of view, they have a product which has perhaps been successfully sold in other countries and for which they have evidence of effectiveness. They can demonstrate its effectiveness to clinicians as well as managers and apparently convince them of its merits but then find closing a sale exceptionally difficult.

Their difficulties are partly due to some of the issues discussed earlier in this section but also because of uncertainty about what will be provided by NPfIT. However, a contributory factor could be the way in which their offerings (which can be

equipment, services or both) are packaged. Companies that invest substantial sums in developing and testing their offerings often take little trouble to research who their potential customers are. The companies also tend not to investigate how their customers would best be able to fund the innovation and integrate it into health or other care services.

To take an example of how complex the options can be for customers, physiological monitoring could be offered as a:

- Home equipment package consisting only of sensors to be connected to a communications system supplied and operated by others.
- Home monitoring package including sensors, communications equipment and software to collect measurements and transmit them to a centre to be specified by the customer.
- Home monitoring service which would include all the equipment in the home and the services of a service or communications centre which feeds information and, when necessary, raises alerts to a specified clinician or carer.
- Complete home care service providing direct care when needed and using home monitoring as one of the tools for effective service delivery.

Depending on which of these is chosen, the charging could be based on one or more of the following:

- Straight equipment purchase
- Equipment plus a maintenance charge
- Equipment, maintenance and communications
- Capital purchase
- Leasing or rental
- Technology refresh – i.e. an undertaking to keep the software and/or the hardware up to date
- A service level agreement
- Numbers of patients or episodes.

5 Initiating and Implementing Successful Projects

To date e-Health has not had a great impact. In addition, those who have tried to improve the way healthcare is delivered by using the applications have faced a range of problems. A particular reason is the complex nature of the necessary change. Some of the issues that projects have to address are:

- the responsibilities and roles of professionals
- commissioning strategies
- funding arrangements
- difficulties with the IT infrastructure.

In addition it appears that, amongst the wide range of organizational changes and pressures to deliver specific targets, e-Health and assistive technology projects are often not initiated in the first place. They have not been able to command attention and priority at the right level within healthcare organisations nor, even more importantly, within a health and social services community.

In the last few months, however, there have been some significant developments with important implications:

- There are now a number of imperatives and, in the medium to long term, other drivers which will lead to major changes in the delivery of health and social care. The best, and in some cases the only, way of meeting a number of these challenges will involve the use of e-Health and Assistive Technologies.
- Many of the obstacles to the implementation of the technologies and applications under consideration are becoming less imposing.

This section of the Report:

- Explores the issues outlined above in greater detail.
- Provides guidance for those at local level who are implementing projects. It identifies good practices and some of the challenges that have been found most demanding in other projects. It also notes certain potential pitfalls to be avoided.
- Makes suggestions for action to be taken at a national level to support and encourage local activities.

5.1 Policy Convergence and Integration

There appears to be an increasing convergence in national health and social care policy towards supporting self care and care at home whenever possible. Just a few recent examples of recent developments in this connection are the:

- NSF for Long Term conditions
- Telecare initiative
- Changing role of the ambulance service to provide urgent support at home rather than transfer to acute hospital.

Despite this, and as noted [in an earlier section](#), many of those who contributed to the Study were concerned about what they saw as an absence of coherent links between the wealth of different initiatives emanating from the Department of Health and its agencies. However, when considered together, there is an argument that practically

all these drive in the same direction. The recently published NHS Efficiency Map¹ could help to clarify some of these relationships.

E-Health can make an effective contribution in meeting the demands of many centrally imposed initiatives. For example, supporting homecare with a range of e-Health applications could help address the requirement of several National Service Frameworks (NSFs).

It is however the case that, except in a very few instances, the potential of e-Health to contribute to meeting the objectives of each particular initiative has not been highlighted in the guidance. The areas where a more explicit approach would appear to have the highest potential are the:

- National Service Frameworks
- 10 High Impact Changes
- Access and waiting list targets

There would appear to be a risk here that if ICT (including e-Health and Assistive Technologies) is not currently seen as fundamental to restructuring the way healthcare is delivered, its potential will be missed and the considerable current investment may not deliver the return it should.

It would be helpful if, in future, ICT is given full consideration when central policy and guidance are being formulated.

5.2 Managing Change

One of e-Health's most important benefits is that it supports better ways of working. The introduction of e-Health often means significant changes in the way that personnel do their work. It also often results in a recasting of the roles of each profession as well as modifications in their relationship with patient and carers. Inevitably, such changes are welcomed by some but resisted by others. Introducing these applications is further complicated because two, if not more, organisations are involved in the vast majority of cases. Therefore, managing the change is very important. Managing attitudes, beliefs and the understanding of those involved is often more important than the more prosaic skills of project management.

5.2.1 Role Changes

E-Health applications can be attractive to many clinicians because applications such as remote monitoring or sharing images can offer immediate benefits when caring for individual patients. However, it can be difficult to persuade busy and dedicated staff to change the way they work. E-Health applications in particular can encounter this difficulty because - almost by their very nature - they challenge the traditional roles and, some might see it, the status of the key players. For example, consultants reviewing electronic referrals and then typing out advice to GPs on how to manage cases are performing a very different role from when they are seeing new patients in a clinic.

In general the change required in introducing these applications is far from superficial. What might appear to be a fairly small change can require staff to adopt a different set of beliefs about what their role is and how they relate to others. In the leg ulcer example described [earlier](#) the roles of the community nurse, GP and vascular surgeon are all significantly changed. Responsibility is transferred from the consultant directly to the community nurse with the GP being almost excluded from

¹ www.dh.gov.uk/assetRoot/04/11/05/61/04110561.pdf

these interactions. In this case the changes have been enthusiastically embraced by those involved.

Problems with changing practices are, of course, not confined to developments involving new technology. However, when new technology is involved, people who are resistant to change can add to the difficulties by, for instance, over emphasising the need for confidentiality or insisting on only accepting locally produced evidence of the efficacy of a particular process.

5.2.2 Project Sponsorship

Projects are much more likely to gain the widespread support they need if they are perceived as being undertaken for the benefit of patients and clinicians. Sponsorship should be by those responsible for patient care and the business case needs to be justified in terms of clinical benefit. Experience has shown repeatedly that what are seen as "IT projects" or "telemedicine projects" are much less likely to be successful.

5.2.3 Leadership

Leadership is particularly important in implementing many of these applications because it is necessary to convince or, ideally, enthuse a whole health community. This is so that all those involved understand and support the plan for the future. They also need to be clear about the benefits for patients and their carers. It is essential that there is joint clinical and managerial leadership.

The question of leadership is also important at a national level. Several public statements by ministers and other politicians have recognised the importance of ICT in general and e-Health technologies in particular. Such comments appear less evident in the statements of leading managers and this can lead to a perception that these developments are not seen as a fundamental element in providing a better service to the population.

5.3 Process Redesign

5.3.1 Sustainability

A number of pilot projects are initially successful but then fall into disuse when the key protagonist leaves. The short term nature of many of the key staff appointments, particularly the medical training grades, exacerbates this problem. The way to overcome this is to try and make sure that the e-Health supported changes are "hard wired" into the clinical processes. In other words they become the way things are done – not an option to be taken if it seems like a good idea at the time.

5.3.2 Modernisation Agency Initiatives

The Modernisation Agency¹, whose functions have now been largely dispersed into Strategic Health Authorities, did a lot of valuable work in helping the NHS to devise improvements in care through the Care Co-operatives as well as by disseminating skills in tracking care pathways and the PDSA (Plan Do Study Act) methodology.

¹ www.modern.nhs.uk

PDSA is very effective in identifying bottlenecks in existing processes. However it does have a drawback in that eliminating an apparent bottleneck in one place can often result in a different bottleneck manifesting itself elsewhere in the process instead. As a consequence, no significant improvement is made to the overall process.

This can mean that the potential of more fundamental innovations, such as e-Health applications and others which involve redesigning the whole system, can be missed. More recently the Agency had shifted its emphasis from improvement to innovation.

We find this move most helpful and hope that this approach will be promoted by the staff now assigned to Strategic Health Authorities and to the residual element of the Agency which is being incorporated into the NHS Institute for Innovation and Improvement - see below.

5.3.3 Mapping the 10 High Impact Changes

One of the most helpful ideas promulgated by the Modernisation Agency, strongly supported at ministerial and departmental level, is the importance of focussing on those 10 High Impact Changes¹ which would bring the greatest benefit in improving health care.

It is possible to see ways in which the use of e-Health applications could support most of these changes. A number of those who contributed to the Study have supported the idea that an attempt should be made to map this out in some detail.

5.3.4 NHS Institute for Innovation and Improvement

The NHS Institute for Innovation and Improvement² formally replaced the Modernisation Agency in July 2005. The remit of the Institute focuses very clearly on promoting innovation. We believe that it should recognise e-Health as one of the potential key drivers for innovation and include it amongst its first considerations.

5.4 Evidence Based Medicine and Management Issues

"It is the mark of a civilised man, and a hallmark of his culture, that he applies no more precision to a problem than its nature permits, or its solution demands." Aristotle

When assessing new ways of treating patients, the preferred evidence is that which comes from randomised controlled trials. These are invaluable in assessing the efficacy and safety of new pharmaceutical products and surgical techniques. They are, however, much less appropriate and lose validity when used to assess changes in a system of healthcare delivery such as the introduction of e-Health applications. This is because:

- in such complex systems it is not possible to separate the changes attributable to the interventions being studied and those that are the result of other influences
- most patients over the age of 50 suffer from more than one disease at a time.

This is not to say that key aspects of e-Health applications should not be subject to the most rigorous trials, randomised where this is appropriate. An example would be comparing diagnoses made by examining patients physically with those made from "store and forward" referrals.

¹ www.wise.nhs.uk/cmsWISE/HIC

² www.institute.nhs.uk

It is also important to take into account the potential for e-Health applications to enable much quicker or more widespread access to care than would otherwise be possible. The National Patient Safety Agency¹ (NPSA) is developing approaches based on alternative risk assessments. In many cases such approaches are likely to be more appropriate for assessing e-Health applications. A related issue in this connection, and one that is very important to take into account, is that the risks of not doing anything may outweigh the risks of proceeding.

There is also a serious problem relating to the economic assessment of e-Health interventions. There is very little high quality published information in this area. This is partly due to the very small scale of most telemedicine and e-Health projects as well as the difficulty of assessing the impact on the whole health system from such smaller changes.

5.4.1 Measurement

Another aspect of ensuring that changes are understood, so that systems can be adapted to improve outcome, is proper measurement. In order to measure improvements and enable formal evaluation, it is necessary to establish appropriate metrics at the beginning of a project.

5.4.2 Modelling

There is a tendency in the NHS to fail to take advantage of techniques, frequently used in industry, to explore the potential outcome of proposed changes through modelling. A number of techniques are available, ranging from discrete event modelling to whole system modelling, depending on the nature of the proposed change. Such techniques have been used to considerable advantage, for example in modelling the vascular surgery described [earlier](#). There would appear to be advantages in their wider use.

5.5 Support and Funding for Telecare

“It is not realistic to plan to deliver care and support services in the way we do at present. We must embrace new ways of working both to meet the diverse needs and aspirations of people using services and to take full advantage of new and developing technologies”

“Telecare is vital to unlocking this future.”

“It is very important that telemedicine and telecare are thought through together”

Liam Byrne MP

Parliamentary Under Secretary of State for Care Service

*Building telecare in England*², 19 July 2005

The Department of Health launched a substantial initiative on telecare in July 2005. Through the Preventative Technology Grant £80m is being made available over two

¹ www.npsa.nhs.uk

² Available from [this page](#) on the Department of Health website

years to local authorities who are encouraged to co-operate closely with PCTs in deciding how to deploy the funds. As well as providing funding, The Department of Health has issued considerable amounts of guidance to supplement *Building telecare in England*. These include:

- Business Case models with supporting guidance¹
- A *Telecare Implementation Guide* accompanied by numerous fact sheets all of which are available from the Telecare section² of the Integrating Community Equipment Services (ICES) web-site.

Overall this initiative provides a valuable opportunity for the NHS to explore.

It is understood that an additional £60M is available as part of the Partnerships for Older People Projects³ (POPP) and that this could also be used for similar provisions. As the funding is being directed to each social Services area, it should also provide opportunities in all districts for the NHS to explore with local authorities how they can co-operate to ensure maximum benefit.

5.6 The role of PCTs

At the Workshop as well as in the interviews a great deal of emphasis and faith was placed on the potential of PCTs to recognise the value of e-Health and to drive its acceptance. This is because they have a unique position in planning, commissioning and delivering e-Health.

PCTs are still developing their role and face very heavy workloads. However a number of them see the application of e-Health in certain areas as being essential to their ability to deliver a service within the resources they have. Others are focusing on the potential these technologies have in supporting patients with long term conditions. A third, and probably the largest, group have not taken the opportunity to examine how these technologies may help them.

PCTs should be strong advocates for innovation and there are a number of factors, especially perhaps the Payment by Results changes, which will encourage them to maintain patients at home whenever they are able and to use e-Health to help them do this.

5.7 NPfIT Implementation

Elsewhere in this Report we have identified the significant benefits that are foreseen with NPfIT as well as the reservations that many have. The process of implementation does, nevertheless, present a unique opportunity for the NHS to consider how its practices can be improved with e-Health. In particular the National Programme will provide elements that are essential to many of the e-Health applications.

- A shared electronic record available to clinicians and patients
- A national data network which should support video, voice and data exchange
- Available image archives

¹ Available (together with *Building telecare in England*) from [this page](#) on the Department of Health website

² www.icesdoh.org/doc_cat.asp?ID=6

³ See [this page](#) on the Department of Health website

The best practice design groups are working to very tight timetables but, where possible, the opportunity should be taken to consider how e-Health applications could be exploited.

The Do Once and Share (DOS) Programme¹ just being launched seems an imaginative approach intended to maximise the benefits of NPfIT. The purpose of the DOS programme is to develop a set of projects that will feed into the design, development and implementation of NPfIT. The programme will engage some 50 local health communities each of which will examine, in some detail, the potential of NPfIT to support provision of better care for a particular condition. The aim is to ensure that the needs of each specialty are taken into account and that NPfIT, including the e-Health components, appropriately supports improved clinical practice.

Some of those who contributed to the Study also felt there was the possibility of taking advantage of the Model Communities Programme² to explore and test ideas for using the functionality provided by NPfIT to enable changes in the way care is delivered.

5.8 Summary of Good Practice for Projects

Assessment of a number of e-Health projects with a range of outcomes has led us to conclude that to be successful they should have:

- commitment of key people in all the organisations that are involved
- clinical sponsorship/leadership
- a project champion positioned with access into each organisation
- capital and revenue funding
- technical support with time to solve problems.

For long term viability, the new processes must be embedded into routine ways of working. Processes which are seen as optional or not integrated into an effective care pathway are likely to fall into disuse.

¹ NPfIT/DOS-pamphlet/14.4.051 DH 2005

² No definitive reference available

6 Conclusions

6.1 The Way Forward

Very few would argue that e-Health, assistive technologies, telemedicine, and telecare will play a very large part in enabling healthcare to be made available more effectively to those who need it. They will also facilitate the improvement of the quality of much of that healthcare. The technologies will help us to look after ourselves better, shift the delivery of the care towards the home and local providers as well as improving the availability of specialist expertise.

Nearly all evaluations of telemedicine and telecare projects report very high levels of patient satisfaction. In an increasingly patient led NHS, with choice at the top of the agenda, one would expect them to be a powerful driver. This will be reinforced by patients' very clearly expressed preference for receiving care at home wherever possible. The likely introduction of direct payment for NHS care for some patients with longer term conditions could increase this tendency.

There is, however, much uncertainty about how quickly it will be possible to exploit the technology and the best way to do so. Differences can be seen clearly if we consider the views that have been expressed to us about the relationship between the applications and NPfIT. Stated bluntly the views are:

- Wait till NPfIT has all the infrastructure, integrated record, PACS and digital infrastructure in place and then develop applications using these.
- Push on regardless because NPfIT won't work anyway.
- Introduce these applications where there is a clinical and business case to do so. Use NPfIT where its solutions are available but, where they are not, use technologies that are planned to integrate with NPfIT solutions or to be superseded by them.

We would argue strongly that the third is the only sensible approach. The key reasons are:

- There are almost certainly lives that can be prolonged and improved as well as time and money that can be saved in the relatively short term.
- It is important to engage clinicians in taking advantage of what e-technology can offer to them and their patients. Many are not interested in NPfIT as such but they are much more likely to engage enthusiastically in e-Health projects that offer practical ways to help their care for patients on a day to day basis.
- There are a number of small and medium sized companies offering innovative and effective solutions which will not survive nor be able to develop important export opportunities without a reasonable home market.

One problem is that implementations of these applications are often viewed as ICT projects. This means that managers and boards tend to look towards sources of funding earmarked for ICT. The objectives, however, are to provide better healthcare and projects should justify themselves in clinical and business terms with the costs and savings being measured against clinical benefit.

It could be helpful to say there will be no more e-Health, telemedicine or telecare projects. Instead there will be projects to improve say cancer or diabetes care which need to use e-Health technologies as a necessary tool.

In suggesting a way forward we are very conscious of the need to avoid making a large number of recommendations. This would be to fall into the trap of perpetuating what many of those who contributed have criticised as what they see as an ad hoc or "stove-piped" promulgation of policy from the Department of Health.

With this in mind we would recommend that, while always keeping improvement of the clinical service as the prime objective, the main focus should be on realising the

benefits through the integration of e-Health applications into the general modernisation and improvement of health services at three levels: local, speciality and national.

6.2 Recommendations

Local

1. PCTs face severe challenges but also have a great opportunity to drive forward the redesign of services to provide better healthcare. We would urge PCTs, in developing the local plans in all specialties but particularly in planning for people with long term disabilities, to examine carefully how e-Health along with NPfIT could support these changes.
2. The ICES¹ (Integrating Community Equipment Services) and POPP² (Partnerships for Older People Projects) programmes are making specific resources available to every part of the country. PCTs should ensure that they take maximum advantage of the potential improvements provided by assistive technologies.

Specialty

3. The Do Once and Share (DOS) programme will help to make sure that the potential benefits of Connecting for Health together with other initiatives and developments are recognised in the treatment of particular conditions. We think it is important that DOS fully takes into account the potential of e-Health technologies.
4. The NSFs (National Service Frameworks) vary in the extent to which they recognise the ways in which e-Health applications could help deliver the objectives they identify. It would be helpful to review the NSFs to ensure they take full account of the potential benefits of e-Health technologies and NPfIT solutions.

National

5. We also believe that key national guidance on service delivery should take into account the potential of NPfIT and e-Health to deliver the objectives. Future guidance should certainly address this. The opportunity should also be taken to highlight and augment this potential in existing guidance where most relevant. In particular, a number of those who contributed to the Study pointed to the 10 High Impact Changes³ as an area where this would be especially useful and we would support that view.
6. There is a danger that the changes in funding being introduced through Payment by Results could contain perverse incentives to discourage the more locally based healthcare which e-Health will support and sometimes enable. It is important that the potential effect of these changes are kept under review to ensure that this does not happen

¹ www.icesdoh.org

² See [this page](#) on the Department of Health web site

³ www.wise.nhs.uk/cmsWISE/HIC

7. For those considering whether these technologies could be helpful in tackling any particular issue there is a lack of readily available information and examples. There are already significant numbers of smaller scale projects which provide helpful lessons but which are largely unreported and unknown. The implementation of NPfIT, the DOS programme and other activities will yield lots of further examples whose value will be limited unless this experience is shared. International experience is often very valuable here, especially from countries with not dissimilar health systems such as Australia and Canada. The support given to the availability of web based information about e-Health by the Department of Health appears to be insufficient and should be reviewed and strengthened. Particular efforts should be made to record evaluation and evidence of clinical benefit together with financial performance. In addition, consideration should be given to international co-operation.

We believe that, if followed, these recommendations would do a great deal to enhance the value that the NHS and its patients might gain in the relatively short term. There still, however, remains a significant problem. The benefits of many of these technologies will only be fully realised when they are implemented across a whole health community. It is for this reason that for a number of years now those with a particular interest in telemedicine and telecare have promoted the idea of concentrating a relatively modest amount of resources on one or two PCT areas so that they would be able to augment the improvements that they are now making to encompass a wider use of these technologies across a number of clinical areas at the same time. This would provide a truly integrated exemplar using and building on the other actions we commended above.

Annexes

Annex A - Interview Findings

We interviewed over 40 people during the Study. The process for selecting those interviewed is outlined in the [Methodology sub-section](#) of the Introduction. The same section also summarizes who took part in the Study in terms of their professional role or background. There is also an [Annex listing the contributors](#).

From the interviews and a review of the notes taken at each meeting we grouped the views expressed into the following five areas:

- The awareness of e-Health concepts
- The impact of other health and care policies
- New systems and patient safety
- Barriers against adoption
- Potential for adoption

An earlier version of the material in this Annex was issued prior to the [Validation Workshop](#).

A.1 The awareness of e-Health concepts

- Much greater than during our first study¹ (as the IHSM Telemedicine & Telecare Project) that reported in May 1998
- There is an increasing number of small local applications but nothing widespread
- New models of care pathways are being developed that require a shared Electronic Patient Record
- For managed care to be successful it has to be supported by integrated/assistive technologies
- There are a lot of independent groups all with a mission to impact on healthcare via technology but they are not using the technology to improve the processes of care
- Of importance is the Integrated Community Equipment Services (ICES) program which will fund £80m for assistive technology focused through Social Services Departments
- Strong support from Stephen Ladyman (Minister for Community Care at the time of the Interviews)

A.2 The impact of other health and care policies

- Payment by Results, Patient Choice and Practice based Commissioning:
These will all influence the dynamics and incentives within the service, but views are varied
- NPFIT has its own schedule and priorities and limited capacity

¹ Jardine I, Clough K, et al *Telemedicine and Telecare : Impact on Healthcare*, published by the Institute of Health Service Management (IHSM), May 1998. Copies available from study@tehip.org.uk

A.3 New systems and patient safety

There is a huge potential for IT to enhance patient safety but:

- Decision support systems do not always fit into clinical workflow
- “Protocols and Guidelines are fine for single conditions but as most people over the age of 55 years have multiple conditions the skill of the generalist will remain paramount”
- Randomised Control Trials are often not a feasible way of assessing the potential of a change
- Hazard assessment is probably a more useful approach with “what if?” scenarios to identify the degree of risk at each stage of the introduction of new technologies.
- There is a need to be concerned about inadvertently introducing hazards into the health system.

A.4 Barriers against adoption

- There is a need for clarity around the definition of what constitutes e-Health....it is still confused for many people.
- E-health is moving at a snail’s pace because of:
 - the size of the NHS and social care services
 - the complexities inherent in the structure of specialties/of professions/of organisations
 - the size of the task
 - the conservative attitudes of many in medicine ... some reassurance is needed that the outcome will be better for patients before changing practice
- Clinical e-Health is suffering from short-termism and the obsession with targets
- Risk of patients looking at the back of a GP’s head while he/she is interacting with records on PC
- “Bean counters look at beds”
- Proof of concept difficult as Randomised Control Trials are not good in this context
- “No good model for the whole health community”
- There is a tension between all participants (organisations/IT/users) that will be difficult to resolve
- There is a need for understanding between clinicians, organisations and users
- Success is achieved when all of these are in harmony but in practice they are all pulling in different directions dependant on their objectives
- e-Health needs to be “hard-wired” and a must do
- e-Health is generally seen as an IT issue BUT clinical benefits not generally understood by IT staff
- Capability of management teams when the modernisation agenda is constantly changing
- Concerns about the scope of N3 to cope with the volume of data especially that generated by PACS and the functionality required for video conferencing
- The timescale involved in a large programme such as NPfIT inevitably means that some telemedicine projects will need to be put on hold until NPfIT and EPR/NHS Care Record are fully instituted
- Telemedicine and Telecare clearly seen as at the end of the NPfIT agenda

A.5 Potential for adoption

- A major benefit of NPfIT and e-Health technologies would be the saving/freeing of clinical time
- It is important in support of the expert patient and in the care of long term conditions
- Very important role for IT in training
- Choose and Book could be an important driver... as appointment books effectively become open, consultants will be concerned about receiving incorrect referrals and may impose rules. For instance, insisting on being provided with pictures as part of a referral.
- Funding not seen as a major issue as most of these technologies can lead to savings but getting the funds in the right place could be a difficulty
- Nothing must be seen as being "IT". In one SHA they are performing "Health Informatics Transformation".
- The DoH Commercial Directorate is trying hard to support industry getting into the NHS. There are moves to consider how high street pharmacies can provide more NHS services locally eg: near patient testing/phlebotomy.

Annex B - Questionnaire Findings

This Annex reproduces the eight questions that made up the Questionnaire and provides an analysis of the responses. It also includes many of the free text comments that were made.

An earlier version of the material in this Annex was issued prior to the [Validation Workshop](#).

Q1 Personal Information

From the information provided we have roughly summarised the profession and current occupation of the respondents as follows:

	Profession	Current Occupation
Clinician	17	6
Informatician/IT Consultant	13	16
Administrator/Project Manager/Director	8	12
Academic	1	5

One respondent gave no information. In some cases there is some overlap, especially with clinicians in academic or managerial posts.

Q2 How aware are you of potential use of these technologies in health and/or social care?

Very	Quite well	Some	Little	Not at all
18	16	4	2	-

Q3 How would you rate your knowledge of the application of these technologies?

Excellent	Very good	Good	Poor	None
4	17	9	10	-

Q4 What role do you believe these technologies will have in delivering better health and or social care?

Vital	Important	Significant	Little	None
17	19	3	-	-

One respondent said:

Long-term: Vital
 Medium-term: Important
 Short-term: Significant

Q5 In what areas and to what extent do you think the potential benefits lie?

	Great	Some	Little	None
Convenience for patients/clients	32	7	1	-
Convenience for staff	23	15	1	1
Saving staff time	22	15	1	2
Saving money	12	17	10	1
Health outcomes	18	17	2	3 did not answer
Empowering patients	20	18	2	-
Supporting home care	24	15	1	-
Improving efficiency	24	15	-	1
Reducing clinical risks	13	23	3	1 don't know
Enabling better clinical care	16	23	1	-
As a catalyst for change	23	13	3	1 did not answer

Respondents were invited to add other potential benefits.

The following were listed under **Great**:

- Reduce social isolation
- Better use of time
- Improve communication & teaching
- Increased independence & autonomy for users
- In the long term: preventing disease, prolonging life and promoting health (rather than treating illness)
- Epidemiological analysis
- Improving interprofessional care / case management
- Data Collection
- Public health
- Patient Records
- Joined up Healthcare
- Integration of primary and secondary care

The following were listed as having **Some** benefit:

- Workforce development (particularly for nursing staff)
- Education and training of clinical staff
- Reductions in inequalities
- Supporting locally based care (if not at home in the community)

One respondent felt that there would be a **Little** benefit for "Facilitation of clinical audit and governance activities".

Q6 To what extent do you think each if the following will impede the adoption of these new technologies?

	Great	Some	Little	None	Don't know
Lack of knowledge and understanding of tools	25	14	1	-	-
Acceptability for patients/clients	8	20	11	1	-
Acceptability for staff	11	23	5	-	1
Fitness for purpose	8	26	6	-	-
Cost	16	20	3	-	1
Technical risk	10	21	7	-	2
Clinical risk	3	20	16	-	1
Poorer service ¹	2	7	17	8	6
Overwhelmed by other targets	23	16	1	-	-
Difficulties of Implementation	17	19	4	-	-
Ongoing technical support	15	19	6		

Respondents were invited to add "Other" impediments.

The following were listed as **Great**:

- Availability of connections, Bandwidth & kit
- Lack of clinical engagement
- Lack of ubiquity/equality of access
- Lack of adequate project and especially change management expertise in NHS (this was listed by 2 respondents)
- Lack of guidance, case studies, courses and reliable information generally
- Absence of clinical protocols/revised care pathways
- Lack of organisational commitment: Big problem is when it has enthusiasts and champions but who then move on to other things. E-Health has to be implemented as part of an overall business strategy
- Clinical terminology as a priority (SNOMED CT)
- Introduction of other clinical coding and grouping systems (i.e. NIC, HRG-4, ICF for social care); Possible exclusion of vulnerable patients
- GPs without computer literacy
- Consent and confidentiality issues
- Destabilising current power and accountability models

The following were considered to be **Little**:

- Weaknesses in NHS change and project management

¹ One responder comments: Poorer service: Not sure what you mean here; e-Health technologies in themselves won't result in "poorer service", indeed they should produce better service, but they need to be implemented as part of an overall business strategy
Another comments more generally: This is a very confusing question as it is asking about my concerns about each of these issues and in one sense I may have little concern about for example the confidentiality because I know the technology but I am concerned, as I know that it can be a barrier to many staff and can even prevent it from being used. This applies to nearly all these points.

- Resistance to change (particularly by clinicians) – also a "potential barrier"
- Inadequate ICT infrastructure (particularly networks, workstations, resilience) particularly at local level
- Absence of technical standards
- Organisational inertia: Successful implementation of e-Health requires substantial cultural change, e-Health has to be evolutionary, not revolutionary.

Q7 In your own organisation/area of activity are any e-Health/telecare applications being used?

	Specialty or Application
1	Palliative care patients using Home VTC link
2	Real-time, web-enabled applications/services are being used in primary care and across whole health communities - 30 plus organisations
3.1	Interactive cardiology in 7 trusts
3.2	Interactive cancer MDT in 4/5 trusts
4	Library and Knowledge Management with interactive delivery of knowledge to the bedside using PDA technology
5	Radiology / Digital diagnostic medical imaging using PACS
6	Spinal injury post-discharge support using videoconferencing on one to one basis with specialist in spinal injury
7	Interactive Education / Incident on-site guidance / third party consultation / sibling support / research case conferences
8	SAP using Integrated assessment and workflow across whole systems
9	Modules using e learning within the university, via blackboard (sic- it goes on to say "Application was introduced to meet the demands of students to access study from home" ?)
10	Dermatology Telemedicine with pictures taken, viewed by remote clinicians, treatment advised
11	Video conferencing and Tele conference
12.1	Managerial/clinical learning –Interwise (?) web cast with interactive meetings and data sharing - from 30 up to around 4,000 users
12.2	Diabetes monitoring and on line communications
13	Paediatric Disability. [Teleconsultation & reminders for medication and appointments] using telephone
14	Management video conferencing
15	SEE TELECARE PAGES ON ICES WEBSITE www.icesdoh.org
16	Supplier of telemedicine systems for dermatology, burn care, plastic surgery, wound management and minor injuries, in use at 25+ acute hospitals and associated PCTs with upwards of 100 users.
17	All specialties/applications: Predominantly store-and-forward through NPfIT/NCRS, N3 will support teliagnosis, videoconferencing, some experimental applications around in NHS. Not yet mainstream NPfIT but on the agenda for later phases as per NHS Improvement Plan

	Specialty or Application
18	Clinical repository linking GP and hospital computer systems is being implemented in Hampshire as an interim system to provide clinical access and a database for supporting whole pathway clinical governance (especially in cancer) with web-based data base
19	Harmoni's Exocet Project: transferring OoH Call Report data electronically to surgery clinical systems. In Wandsworth we will be complying with the pre-existing GPMail service
20	Single Assessment pilot between SS and WPCT with Framework database
21	Cancer Network and MDTs using video conferencing
22	COMMUNITY PHARMACY -Patient medication record systems-community pharmacies, bespoke software for a pharmacy service
23	Home care monitoring was started but abandoned because too labour intensive.
24	Project management & clinical application using audio & video-conferencing for educational purposes & consulting with others for more clinical applications to enable practice
25	Tele Medicine (using GSM) and Electronic Patient Report Forms (using smart cards) in Ambulance Service
26	Conferences from ambulance cars to A&E facilities ECG transmissions to A&E Input from A&E personal to update medical record PACS usage to cover all medical imaging (including rectal images, histopathology, cytopathology, dermatology images and reports availability, including video clips; i.e. behavioural disorders)

Q8 How important do you think each of these potential barriers will be?

	Very	Somewhat	Minor	Not at all	No Answer
Understanding of the potential	18	17	2	-	3
Lack of evidence of benefit	17	15	4	-	4
Low priority within National Strategy ¹	15	16	4	2	3
Lack of exemplars	10	22	4	1	3
Attitudes of patients	3	11	20	2	4
Attitudes of clinicians	17	15	5	-	3
Issues of Confidentiality	9	17	6	2	6
Ethical/legal issues	8	16	8	2	6

¹ responder comments: Low priority within local strategies probably more of a barrier

	Very	Somewhat	Minor	Not at all	No Answer
Insufficient funding	19	13	2	-	6
Fear of de-skilling professionals	-	14	16	5	5

Respondents were invited to add "Other" potential barriers.

The following were listed as **Very** important:

- Complexity of decision making
- Lack of organisational commitment
- Absence of (published) national policy
- Absence of reimbursement mechanisms
- Understanding importance and purpose of clinical coding and terminology systems in EPR
- Training of staff
- Lack of investment in communication and marketing of operational deployment
- Low priority within local strategies
- Perceived threat to current models

One respondent considered "Organisational inertia" **Somewhat** important.

Annex C - Validation Workshop Outputs

As explained in the [Methodology Section](#) in the Introduction, the findings from the [interviews](#) and [questionnaires](#) were validated at the one-day Validation Workshop hosted by the Department of Trade and Industry. The Workshop also explored next steps and means of making progress.

The day consisted of presentations, plenary discussions and break-out sessions. There were breaks for networking as well as demonstrations of equipment, services and products.

In the morning there were two parallel break-out sessions. One considered Urgent and Scheduled Care, the other Long Term and Preventative Care. In the afternoon two further parallel sessions took place. Both addressed the topic of how to move forward.

This Annex reproduces, with minor updates, the material that was issued following the Workshop.

C.1 Urgent and Scheduled Care

This section consists of bullet points and notes from the morning break-out session on Key Issues and Challenges in Implementing e-health Innovations for Urgent and Scheduled Care chaired by Linda Kennedy.

C.1.1 General Points

- Forget the technology
- Focus on changing the process of how health care is delivered.
- Keep in mind:
 - What problem are you trying to solve?
 - What does the change mean for the patient?
- Invite all key players in the patient process to meetings to understand how to change the process of a particular care pathway eg: in COPD, management of Diabetes, Cancer. The use of technology to improve processes will fall out of the discussion to improve care pathways.
- Build upon some excellent work already undertaken by the Modernisation Agency. However many changes were proving difficult to sustain and not always addressing the right problem or taking a whole system approach.
- Payment by Results (PbR) places too much emphasis on bed days. HRGs offered some benefits but needed input from clinicians not just finance people.

C.1.2 Encouraging Change

- The rational approach being advocated would not work because people were irrational.
- There was a fear of change and the NHS was very bad at working through change and project management.
- There was a need to create a desire for change.

- The medical profession was "lamentably conservative and hierarchical". The need for change was being accepted by professions such as nursing and radiography but the older and more established professions were more difficult.
- However, young doctors were very good at using IT for existing processes and would be good resource for developing new ways of working. Once an EPR is installed, there is "huge enthusiasm". Junior doctors get "dug in" and start "pushing consultants along" to use it.
- One of the problems with the best practice groups was that they had looked at what they were currently doing rather than at what they should be doing.

C.1.3 Links to future hospital buildings

Future Health Care Network was looking at 3 areas:

- Models of Care
- Procurement
- Building Design

The planning horizon for models for care was around 10 years. In contrast hospitals are built to last for 30+ years.

C.1.4 Training

- Training was inadequate and there was agreement that NHS Institute of Learning, Skills and Innovation (NILSI), the replacement for NHSU (NHS University), needed to look at e-Learning.
- There is a need for people to see prototypes. In banking there was, as always, something going on and it was usual to spy on competitors to see what use they were making of technology. There appears to be nothing similar in health. Although in developing the single assessment process for older people it was recognised that NPfIT had gone a long way to asking clinicians what was needed. The shortfall was in the time that could be given to this.
- Consider Business Process Re-engineering and how web technology could be exploited.
- Learning from experience elsewhere:
 - When MRI equipment first came out it was equipped with a wide variety of features but they were machine-centric. This meant that settings had to be altered frequently to suit the clinicians' needs and preferences particularly with respect to image sequences. Nowadays the design is such that it is only necessary to enter the identity of the clinician. There might be analogy to draw on for NPfIT.

C.2 Long Term and Preventative Care

This section consists of bullet points and notes from the morning break-out session on Key Issues and Challenges in Implementing e-health Innovations Long Term and Preventative Care chaired by Gill Kelly.

- The patient journey: how will e-Health support this?

We need to consider the model of care and how we contribute.

Chronic care demonstrates a model of care illustrated by care pathways:

- Route of entry
- Assessment

- Advice on care
- Gets better (we hope)
- Another episode
- E-health should not be seen as the solution to all problems.
- More pilot/prototype innovation work should be scrutinised and information shared; drivers and inhibitors should be identified so that informed decisions can be made.
- All patient contacts should be recorded so that a profile can be built up; this drives down costs and allows providers to compete better.
- When will we achieve the “patient journey?” – now or in 10 years? People have very high expectations and will expect the system to build up information in order to predict likely health outcomes.
- Culture of the NHS needs to be addressed; it’s a loose federation; outcomes are dependent on frontline staff. Quality of care needs to be the selling point and is a way in to winning the argument.
- Evidence based agenda lays down quality of care and outcomes and competes against guidelines.
- More chronic care is being delivered away from the bedside; e-Health can assist in this by delivering services electronically; 3G offers healthcare in your pocket.
- Benefits need to be assessed in terms of improvements in quality of life; this is not always apparent to the department which buys the product.
- Take account of the proportion of patient care paid for by patients/relatives (c15%) – improve the effectiveness of this investment.
- National care record systems must be completely open - “Nothing about me without me”.

C.3 How to Move forward - 1

Notes from the afternoon break-out session chaired by Ian Jardine

Discussion points:

- Addressing the barriers required education particularly to correct the impression that e-Health solutions are expensive.
- Users and carers should be asked what they really need and want.
- "Try it; then communicate results".
- "Turn one PCT upside down" i.e. concentrate changes on one PCT.
- Use of prototyping and parallel running based on how www/internet have evolved; blogging could also be exploited.
- Some small things can done immediately.
- Only use compatible components for interfacing and integration.
- Need for Information Sharing.
- It was suggested that there was a need for better information sharing but through the WWW as paper was not the best medium: The TeHIP web site was suggested as a suitable place.
- Attention was drawn to the CHD collaborative website by Paul Johnson who commended it highly and observed in connection with its content that "some ideas are bombshells".
- Funding for Telecare has recently been announced:

- £80M (not discussed further).
- £60M Partnerships for Older People Projects (POPP).
- Applications for funding from POPP have to be made by council social services departments in collaboration with at least one PCT. Each council can only make one application.
- It is important for the funds to go to the right place and for them to be spent properly.
- Outcomes and Patient/Carer Involvement
 - The importance of having measurable outcomes was discussed with particular reference to the Harvard outcomes review which has 21 metrics associated with it.
 - Because they are the ones most affected, patients and their families could be the biggest champions for e-Health.
- PCTs and Acute Care Issues
 - NPFIT and Acute Care tend to get the attention. It is encouraging that PCT representatives are now turning up to workshops etc.
 - PbR (Payment by Results) and its HRG based approach leads to an emphasis on inpatients and care in hospitals. There is no incentive to develop alternative models of care with current PbR arrangements.
 - A view that PCTs had a vital part to play but were not performing. Even though a PCT which had been given a demonstration of telecare had considered it "fantastic" the person involved had no time to do anything about taking the matter further. It was suggested that if someone in the NHS says they "don't have time" to see a supplier, the supplier should point out "in that case you need to see me".
 - One of the problems that NHS staff face is continuous change. This does not, however, equal progress.
 - Many health care professionals are keen on suitable technology but there is a need to communicate with social care colleagues.
- Voluntary groups may have a part to play.
- There is a need to champion to champions but there is a problem that they are often seen as mavericks.
- In some cases it has been possible to bring together health and social care as well as finding funds but both clinical and managerial leadership are needed.
- The NHS Management blame based culture is destructive and a different atmosphere is needed.

Key points

1. Allow opportunities to innovate:
 - Local flexibility
 - Importance of a demonstrator locality.
2. Measurement of outcomes and metrics.
3. Involving users and carers (asking them what they need).
4. Key role of PCT commissioners.
5. Importance of removing the potential perverse incentive of Payment by Results.
6. Integrate with Social services:
 - ICES programme
 - Voluntary organisations.
7. Importance of leadership.

C.4 How to Move forward - 2

Notes from the afternoon break-out session chaired by Gill Kelly

Main points:

- NPfIT must deliver a service, not a system
- Need to innovate, collaborate and integrate with social care/users at a local level
- Collaboration needed between the NHS and Dept for Education
- Patient and relatives at the centre of the process
- Good high quality information to allow patients to be properly involved in their care
- Tools and education should be available for patients to access and use information – e.g. via schools and NHS Direct
- Repository of information
- who is doing what and where (including in social care) – via interactive processes (website); process chasing; contacts; use national audits to identify quick wins
- Shared ownership of own care record
- Allowing real involvement in prevention/treatment: ? via NHS Direct
- Intelligent systems
- Small percentage will need an alternative
- NPfIT first: NCRS – Citizens involvement during development
- Involve users and carers – find out what they need and what they want
- Involve PCTs who are in a key position re commissioning
- Payment by results – money must follow the patient

Annex D - List of Contributors

We are grateful to all the following people who contributed their views and helped to make a success of this Study. Job titles and organisations are those at the time main contact was made.

Name	Job Title	Organisation
A		
Mike Andersson	ICT Consultant	Andstrom Consulting
B		
Dr Maureen Baker	Primary Care Lead	National Patient Safety Agency
Shreyas Bakshi	Technical Advisor	Health Tech, University of Warwick
Junnet Barros	Heart Failure Specialist Nurse	Wandsworth PCT & St. George's Healthcare Trust
Jenny Belza	Project Manager	Northampton PCT
Dewinder S Bhachu	Consultant Clinical Scientist PACSnet	St George's Healthcare Trust
Paul Bond	Operations Manager	Harmoni Ltd
Sean Brennan	Director	Clinical Matrix Ltd
Jim Briggs	Deputy Head, Dept. of Information Systems and Computer Applications	Portsmouth University
Dr Georg Brox	Director	HB Consulting
Dr Mark Buckley-Sharpe	President BCS Health Informatics London and South East Specialist Group	University College London Hospitals
Sheila Bullas	Secretary	BCS Health Informatics Forum
Annette Bunka	Service Improvement Manager	South Manchester PCT
Mary Burrows		Northampton Primary Care Trust
C		
Andrew Capey	Data and Security Manager	Royal Brompton & Harefield NHST
Chris Carrigan	IT/Video Lead	Cancer Action Team
Dr Beverly Castleton	Consultant Physician and Associate Medical Director	North Surrey Primary Care Trust
Dr Susan Clamp	Director	Yorkshire Centre for Health Informatics, University of Leeds
Keith Clough	Co-ordinator	TeHIP Group
Andrew Colleran	Project Manager	Quercus Information
David Cousins		National Patient Safety Agency
Elizabeth Crocker	Chief Executive Officer	CareMax Group Ltd
Barry Cross	Managing Director	ReView Video

Name	Job Title	Organisation
Graham Currey	Assistant Operations Manager	Lancashire Ambulance Service NHS Trust
Dr Richard Curry	e-Health Consultant	Imperial College
D		
David Danson	Sales and Marketing Director	Vivatec Ltd.
Rachel Denton	ICES team member for West Midlands	Integrated Community Equipment Services Team
Mr Simon Dodds	Consultant Vascular Surgeon	Good Hope Hospital NHS Trust
Lynne Dunford	Practice Manager	Marcham Road FHC, Abingdon
Peter Drury	Consultant	PD Consulting Ltd
Terry Dwyer	Managing Director	Margolis Group
E		
Prof Brian Edwards		University of Sheffield
F		
Mike Fairey	Commissioning Editor	BJHC & IM
Mark Farrar	Chief Infrastructure Architect	NHS Connecting for Health
Jayne Featherstone	Conference Executive	BJHC Limited
Gary Fereday	Policy Manager	The NHS Confederation
Janet Ferguson	Consultant in Modernising Healthcare	
David Fincham		ReView Video
Dr Fleur Fisher	Director	Healthcare-ethics Consultancy
Dr Tineke Fitch	Senior Lecturer	Healthcare Computing Group, University of Portsmouth.
Adrian Flowerday	Managing Director	Docobo Ltd
Richard Foggie	Study Sponsor	Department of Trade and Industry
G		
Dr Richard Gibbs	Retired Chair of CEO's IM&T Committee	
Charles Goody	Chairman of IT Committee of NHS Confederation	Chairman, South Midlands SHA
Karl Graham	Sales and Marketing Director	United Telemedicine Ltd
Sir Muir Gray	Director of Clinical Knowledge, Process and Safety	NHS Connecting for Health
Jean Green	Social Work Sector Manager	London Borough of Wandsworth
Dr Sian Griffiths	Chair of the International Public Health Committee	Faculty of Public Health of the Royal College of Physicians
H		
Ms Linda Hands	Consultant Vascular Surgeon	Oxford Radcliffe NHS Trust

Name	Job Title	Organisation
Adam Hanina	Executive Director	European eHealth Forum
Lesley Hannam	Policy Manager	Department of Health
Dr Glyn Hayes	Chairman BCS HIF and Study Sponsor	BCS Health Informatics Forum
Simon Higgs		St Richards Hospital, Chichester
Tony Hill	Innovation Manager, Hampshire & IoW	NHS Innovations South East
Sue Hills	Development Facilitator	Wandsworth PCT
Gordon Hextall	Chief Operating Officer	NHS Connecting for Health
Mik Horswell	ICT Consultant	TeHIP Group
Lord Hunt	was Chairman NPSA	National Patient Safety Agency
J		
Ian Jardine	Telemedicine Consultant	TeHIP Group
Kevin Jarrold	Director of Information Management	University College London Hospitals
Paul Jenkins		NHS Direct Extended Services
Dr Paul Johnson	Telemonitoring Research Centre	Oxford Radcliffe NHS Trust
Colin Jordan	SeniorLink Development Manager	Help the Aged
Dick Joseph	Business Planning and Government Relations	Tunstall Group Ltd
K		
Dr Jonathan Kay	Consultant	Oxford Radcliffe NHS Trust
Gill Kelly	Health Management Consultant	TeHIP Group
Linda Kennedy	Telemedicine Consultant	TeHIP Group
Peter Kruger	Analyst	Wireless Healthcare
Michael Lake	Director General	Help the Aged
Elizabeth Lawler	Policy Manager	NHS Connecting for Health (Social Care)
Brian Layzell	Informatician	
Peter Levene	Project Manager	Docabo Ltd
M		
David Mackintosh	Chief Executive	NHS Innovations South East
Bruce Madge	Librarian	British Medical Association
Lynne Maher	Head of Innovation Strategy	NHS Modernisation Agency
Kingsley Manning	Chief Executive	Newchurch
Dr William Maton-Howarth	Chief Research Officer for Public Health and Study Sponsor	Department of Health
Tad Matus	Chief Information Officer	Surrey and Sussex SHA
Dr Laurie Miles	GP & Executive National	Bethany Medical Centre,

Name	Job Title	Organisation
	Vision User Group	St Helens PCT
Tosh Mondal	Chief Technology Officer	National Patient Safety Agency
O		
Helen O'Kelly		Department of Health
Mark Outhwaite	Director of Technology in Health Team	NHS Modernisation Agency
P		
Helen Pain	Research Officer, THRIVE Project	Salisbury Healthcare NHS Trust
Dr Bette Pembridge	GP	Marcham Road FHC, Abingdon
Trevor Perry	Director of Government Affairs	GE Healthcare
Curt Plaskon	Vice President, International Sales	Honeywell HomMed Telehealth
David Preston	Independent Consultant	TeHIP Group
Terri Price	Vice President International	Honeywell HomMed Telehealth
Samantha Prigmore	Nurse Consultant	St George's Healthcare Trust
R		
Chris Ranger		National Patient Safety Agency
Carol Rice		DTI
Tony Rice	Chief Executive Officer	Tunstall Group
Professor Mike Richards		Cancer NSF
Sue Richardson	Cancer Data Manager	St Richards Hospital, Chichester
Jean Roberts	Health Informatics Consultant	Phoenix Associates
Dr Nicholas Robinson	GP and Technical Director	London NHS Direct
Beki Ruban	Head of Implementation and Health Implementation Director	National Programme for IT
Kay Rulton	FHN Network and Communications Officer	NHS Confederation
S		
Helen Sampson	Nurse Informatician	St Richards Hospital, Chichester
Dr Hugh Sanderson	Information Lead	Central South Coast Cancer Network
Dr Martin Severs	Professor of Health and Social Care	Portsmouth Institute of Medicine
Paul Shobrook	Health Informatician	West Midlands South SHA
Linda Sibson	Senior Lecturer	University of Hertfordshire
Mr Mike Sinclair	Deputy Chief Information Officer	Surrey and Sussex SHA
Ben Sissons	Research Student	Cardiff University
Dr Anba Soopramanien	Spinal Injuries Consultant	Salisbury Hospital NHS Trust

Name	Job Title	Organisation
Laurence Smith	Marketing Director	Zeon Healthcare Ltd
Anne Spencer	Nursing and Midwifery Informatician	Portsmouth Hospitals NHS Trust
Daniel Steenstra		Health Tech, University of Warwick
Dr Chris Streater	Medical Director	St George's Healthcare Trust
T		
David Tamby Rajah	Community Pharmacy Lead	Wandsworth PCT
Malcolm Teague	NHS/HE Co-ordinator	UKERNA
Cherill Thompson		BJHC Ltd
Kim Tolley	Nurse & Senior Lecturer	Kingston University
Nigel Tomlinson	Principal Scientific Advisor, Engineering, Technology & Environment	Estates and Facilities, Department of Health.
V		
Ali Valli	Project Manager	South West Oxfordshire PCT
W		
Janet Walden	Head of Promoting Independence	Care Service Directorate, Dept. of Health
Mike Walker	Head of Digital Information Policy	Department of Health
Robert Ward	e-Health Policy Manager	Department of Health
Moira Watkins	IM&T/Administration	Hertfordshire Partnership NHS Trust
Dr Ian Wells	Head of Scientific Computing, Department of Medical Physics	Royal Surrey County Hospital
Prof Keith Wilson	Professor Primary & Community Care	University of Sheffield
Richard Worrell	Managing Director	United Telemedicine Ltd
Y		
Dr David Young	Physician in Acute Medicine	Birmingham Heartlands and Solihull NHS Trust

Annex E - Outside England

E.1 Other UK

Time and resources have meant that this Study has generally been confined to the situation in England. We are, however, aware - to a more limited extent - of developments in the other three countries in the UK. They have the advantage of a less complex structure. The lines of communication to ministers as well as the legislative bodies (Scottish Parliament, Welsh Assembly and former Northern Ireland Assembly) being more direct. The geography of these countries also poses challenges to the delivery of healthcare which more obviously need to be addressed with telemedicine.

Both Scotland and Wales have had centrally sponsored telemedicine programmes running for a number of years and in both countries a number of services are now delivered routinely by telemedicine. Progress does, however, appear to have been much slower than had been anticipated. We have not had the resources to verify this nor, more importantly, explore the reasons. Northern Ireland, has long been a leader in adopting e-Health applications and provides some impressive examples for a relatively small population specifically linking Minor Injury Units to the A&E department and Teleneurology¹.

E.2 Europe

Unsurprisingly, most, if not all, European countries have been developing e-Health applications of various types depending on their particular requirements. As examples (there are many more), the Norwegians were pioneers of telemedicine links enabling video consultation – the Norwegian Centre for Telemedicine in Tromsø² has been very active and involved in a number of pan-European projects. The Finns, through STAKES³ (the National Research and Development Centre for Welfare and Health), have developed a range of applications including remote monitoring systems for patients at home. The Germans have been very interested in electronic prescribing and the use of health smart cards. Some very interesting smart card trials have been carried out in Italy, notably in the Trieste region.

The European Union has been very active in promoting pan-European projects in e-Health, first through the AIM (Advanced Informatics in Medicine) programme in the early 1990s, followed by the Information Society Programme which had a strong Health Informatics section. The research programme continues through the EU's Framework programmes⁴.

The "e-Europe" programmes seeking to develop all aspects of electronic delivery of services have all included a range of e-Health targets and, in a recent statement (20 May, 2005) before a conference in Tromsø, Commissioners Markos Kyprianou, (Health and Consumer Protection) and Viviane Reding (Information Society and Media), called on governments and the private sector to make better use of information and communication technologies (ICT) in Europe's healthcare systems, using technologies that empower patients, improve healthcare and save lives.

¹ Patterson V. Teleneurology. J Telemed Telecare. 2005;11(2):55-9.

² www.telemed.no/index.php?language=en&cat=4259

³ www.stakes.fi/english/index.html

⁴ www.cordis.lu/fp6/activities.htm

Further information can be found in the e-Health section¹ of the EU's Information Society web site.

The European Health Telematics Association² (EHTEL), based in Brussels, was founded to bring together groups from across Europe with an interest in developing e-Health activities. It has a range of interest groups, including industry, health care professionals, administrations and patients.

E.3 Beyond Europe

Elsewhere in the world - particularly the United States, Australia and Canada - significant use is made of the technologies under consideration. This is often to overcome the serious problems of distance faced in these countries. Many of the devices now available for video conferencing and remote monitoring together with the software systems that support them have been developed in the US. Though there is much to learn from these countries, the use of particular applications appears to be patchy and a long way from being integrated into a community-wide healthcare system.

¹ http://europa.eu.int/information_society/eeurope/2005/all_about/ehealth/index_en.htm

² www.ehtel.org

Annex F - Bibliography

This Annex lists a small number of documents and web sites providing relatively recent information or reports on e-Health and Assistive Technologies. A number of these are also referenced in the main body of the report. This Annex does not list more general documents such as those covering broad NHS policy.

- Audit Commission, *Older people - implementing telecare*, July 2004¹
- Audit Commission, *Assistive Technology: Independence and Well-being 4*, February 2004²
- British Medical Association, *Healthcare in a rural setting*, January 2005³:
- Department of Health, *Building telecare in England*⁴, July 2005
- Department of Health, Health and Social Care Change Agent Team (CAT), Housing LIN Factsheet no. 5 - Assistive Technology in Extra Care Housing, August 2004⁵
- Department of Health ICES (Integrating Community Equipment Services), *Telecare Implementation Guide*⁶ and numerous fact sheets, July 2005 onwards
- Health Select Committee, *The Use of New Medical Technologies within the NHS*, Fifth Report of Session 2004–05⁷, April 2005

¹ Available in html and pdf on [this page](#) of the Audit Commission web site

² Available in html and pdf (with related documents) from:

www.audit-commission.gov.uk/olderpeople/olderpeoplereports.asp

³ html: www.bma.org.uk/ap.nsf/Content/healthcarerural

pdf: [www.bma.org.uk/ap.nsf/Content/healthcarerural/\\$file/rural.pdf](http://www.bma.org.uk/ap.nsf/Content/healthcarerural/$file/rural.pdf)

⁴ Available from [this page](#) on the Department of Health website

⁵ Available in pdf from the Health and Social Care Change Agent Team (CAT) Telecare and Assistive Technology web page www.changeagentteam.org.uk/index.cfm?pid=188

⁶ Available from Telecare section of ICES website www.icesdoh.org/doc_cat.asp?ID=6

⁷ html: www.publications.parliament.uk/pa/cm200405/cmselect/cmhealth/398/39802.htm

pdf: www.publications.parliament.uk/pa/cm200405/cmselect/cmhealth/398/398i.pdf

Annex G - Glossary

This Glossary provides a list of abbreviations and acronyms used in the text of the Report. Terms such as e-Health, telemedicine, telecare, applications, devices, etc. are explained in the [Terminology section](#) of the Introduction.

Term	Expansion
A&E	Accident and Emergency
ASSIST	Association for ICT Professionals in Health and Social Care
BCS	British Computer Society
CCU	Coronary Care Unit
CfH	NHS Connecting for Health – DH Agency implementing NPfIT
COPD	Chronic Obstructive Pulmonary Disease
DGH	District General Hospital
DH	Department of Health (in England)
DiTV	Digital interactive TV
DoH	Department of Health (in England)
DOS	Do Once and Share - a CfH Programme
DTI	Department of Trade and Industry
ECG	Electrocardiogram
EHTEL	European Health Telematics Association
EPR	Electronic Patient Record
GP	General Practitioner
HIF	Health Informatics Forum (BCS)
HRG	Health Resource Group
ICES	Integrated Community Equipment Service (Department of Health)
ICT	Information and Communication Technologies
IHM	Institute of Healthcare Management
IHSM	Institute of Health Service Management (now IHM)
MDT	Multi Disciplinary Team
N3	New National Work (replacement for NHSnet)
NCRS	National Care Record Service
NeLH	National electronic Library for Health
NICE	National Institute for Health and Clinical Excellence (formerly National Institute Clinical Excellence)
NPfIT	National Programme for IT
NPSA	National Patient Safety Agency
NSF	National Service Framework (NHS)
PACS	Picture Archiving and Communications System
PbR	Payment by Results (NHS)
PCT	Primary Care Trust (NHS)
PDSA	Plan Do Study Act
PIR	Passive infra-red (sensors)
POPP	Partnerships for Older People Projects (Department of Health)
RCT	Randomised controlled trial
TEIS	Telemedicine and E-health Information Service
TIE	Telemedicine Information Exchange