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A SURVEY OF E-HEALTH INITIATIVES ACROSS THE COMMONWEALTH

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SUMMARY

This paper summarises findings of a qualitative survey of all 53 Commonwealth Ministries of Health (or equivalent) conducted in December 2007. Member states were asked about e-health initiatives in their countries by answering seven open-ended questions. They were asked to describe:

- 1) a successful and challenging e-health initiative;
- 2) the financial challenges and costs associated with implementation of this programme;
- 3) technological challenges in implementing e-health;
- 4) ethical issues raised during design and implementation of e-health programmes;
- 5) legal or regulatory changes necessary for implementation;
- 6) outcomes of e-health initiatives; and
- 7) further initiatives and contacts.

2. RESULTS

2.1 As of April 2008, 25 (49 per cent) of Commonwealth countries have responded to the survey (Attachment 1). Of these, 19 provided information on a range of initiatives, at different stages of development, and several provided insight about why they have no e-health initiatives to report. Thus this report is limited to observations about respondents only and may not reflect all trends across the Commonwealth.

2.2 Reported initiatives range from nation-wide Information Communication Technology (ICT) networks, surveillance systems, and databases to pilot projects such as including a health component in a school-based e-learning programme. In general, most respondents focused on setting up national or regional ICT networks which create surveillance-based databases, electronic health records, and improved communications among health care organisations, providers, and consumers.

3. INITIATIVES

3.1. A list of Commonwealth e-health initiatives is attached at Annex 1. By region, examples of initiatives include:

Africa. Of the seven African reports, four report technologically advanced/sophisticated broad initiatives such as “SmartCare” – an electronic patient record held on a secure “credit card appearing device” integrating points of service with a national Health Management Information System (Zambia); a nationwide integrated health data management system for diverse users (the Sierra Leone Integrated Data System); setting up basic government internet and email networks (Malawi). Others report smaller scale or limited projects, such as electronic patient record keeping in selected hospitals and clinics linked to the HIV/AIDS programs (Botswana); school-based e-learning projects (The Gambia); ICT skills development among medical personnel at select hospitals (Uganda); and a mix of 11 national programs and “various local systems in collaboration with NGOs and university” (Mozambique).

Asia. Singapore is implementing extensive e-health projects. The medical record exchange (EMRX) in Singapore enables data exchange among public hospitals, and will now move to other hospitals; a national database was developed in 2006.

In Bangladesh e-health initiatives have been underway since 1998 in the Ministry of Health & Family Welfare, including:

“(a) collection and exchange of health service data across all service delivery points, health managers at different tiers, and officials at MOHFW to support monitoring of progress of health programs and policy decisions; (b) conducting annual household survey, personnel, logistic and financial MIS; (c) telemedicine; and (d) e-records, etc. Computers have been provided to MOHFW, central store for medical supplies (national level), all national and regional tertiary hospitals, all district health managers, and most of the 464 sub-district hospitals.”

Sri Lanka reports extensive use of computers in Ministry of Healthcare and Nutrition, a website for dissemination of program information and activities.

Caribbean. Overall Caribbean respondents report being at early stages of e-health initiatives but there is a range of development of e-health within and among countries. For example, Jamaica reports initial development of e-health/computerisation, in a context of “technophobia” in one region while also implementing an electronic health record (EHR) system and national telemedicine initiatives. Trinidad and Tobago are embarking on a National Health Information system. Barbados has an initial taskforce drafting strategy and policy for information technology management in primary and tertiary care. St Kitts reports no specific e-health initiative yet but that it may be incorporated into a wider e-government initiative. Grenada reports no specific e-health initiatives.

Europe and Canada. Malta reports an e-health portal integrated with its healthcare information system and government networks. Cyprus reports computerising two hospitals and is embarking on adopting software applications for e-health programs of EHR, database management, health care networks.

On the other hand, England's National Program for IT appears to be a large and complex state-of-the-art system which connects all NHS organisations, provides infrastructure, EHR, e-prescription services, and patient-controlled hospital appointment management, picture archiving and communication systems.

The Canadian Federal/Provincial/Territorial collaborative "Infoway", a non-profit corporation, intends to accelerate e-health information systems. "All jurisdictions in Canada are working together in the expectation that health information and communications technologies (ICTs), such as electronic health records (EHRs), telehealth and public health surveillance systems, will significantly improve access to health care services, patient safety, quality of care and productivity." This has translated to 240 projects across the country.

Pacific. Australia and New Zealand are implementing extensive e-health projects. "In Australia, the East Goldfields Regional Reference Sites, have implemented a virtual practice network health care providers in region since 2005. Nationally, the E-Health Transition Authority (NEHTA), is a state funded not for profit company covering all jurisdictions since 2005." It includes clinical information, medical products directory, e-health consent framework, EHR specifications, standards implementation. Standardised clinical terminologies is facilitated by Systematized Nomenclature of Medicine – Clinical Terms (SMONED-CT).

New Zealand is embarking on a far-reaching strategy which "focuses on the gaps between health organisations, aiming to remove information and technology barriers to collaborative healthcare delivery within and across service settings. HIS-NZ provides the key elements for a federated electronic health information model".

The Cook Islands implementation of MEDTECH32 has allowed centralization of medical records and creation of a single database. On the other hand Papua New Guinea reports that without a broadband infrastructure there has been little opportunity to develop e-health initiatives.

4. CHALLENGES

4.1 There are challenges in all dimensions: finances, technology, ethics, and legal frameworks. Financial and technological challenges are so closely related however that responses to each question often overlapped.

4.2 The most frequently cited challenges are low bandwidth, especially in rural and remote areas, and the high costs of equipment and training. Financial and technological challenges vary within and between regions but some issues are common across the Commonwealth.

Financial Challenges

4.3 *How much are member countries spending on e-health?* Not all countries provided figures on spending, but estimates of the actual amount spent on e-health across the Commonwealth range widely. The highest amount is reported by England, in a 2006 National Audit Office report of £12.4billion over 10 years, while others report none, or as low as US\$27,000 for one web application (Mozambique's Ministry of Health portal). Such

large expenditures as reported by England include issues such as developing procedures to standardize and streamline processes for supplier contracts.

4.4 In most countries, financial challenges relate to equipment and telecommunications infrastructure. For some, physical geography exacerbates the issue. For example, Australia, Cook Islands and Canada all report problems in servicing remote communities. As summarised by Canada,

“Development of an interoperable, integrated electronic health record system in a decentralized federation with a small population ... scattered throughout a ... very large landmass that includes the far North, poses financial and other challenges. (These include) 14 different jurisdictions, ... few standards, ... need for interoperability, ... inadequate bandwidth particularly in the North. ... System development costs and project oversight amount to \$1.6billion CAD.”

4.5 *Sources of funding vary.* Some initiatives represent national fully state-funded strategies, while smaller local projects may be externally funded. Specific projects may be fully funded by one source, others are have different sources of funding at different stages, and funding may be fully handled within the country or include external sources.

4.6 Some African countries report technologically complex initiatives, with funding provided by donors such as the US Centre for Disease Control (Zambia’s SmartCare Initiative), joint funding with agencies (WHO Gambia Office). Others fund the initiatives through cross-jurisdictional funding, and may include public-private partnerships. For example, Australia’s East Goldfields project accounts for A\$9.2m, transitioning to a locally owned private network in 2006; the National E-Health Transition Authority is split-funded by the Australian Commonwealth and state/territory governments – A\$18.2m base funding 2005-2008, plus A\$130.2m 2006-2007. Jamaica reports that funding challenges for a national project included “Venture capital (and)... partnerships with commercialisation of (the) project”.

4.7 The Singapore Ministry of Health only provides start-up costs, others are borne by providers and other organisations. The New Zealand report illustrates mixed funding:

“Central Government provides around NZD\$1.0m per annum for governance of, oversight of, and leadership for the implementation of HIS-NZ... There is no central funding to implement the strategy. Rather it relies on those organisations in the sector that do have funding to allocate it in ways that achieve the aims of HIS-NZ.”

Caribbean. Jamaica’s regions and national initiatives are at widely different stages of development and funding sources (as noted above, these include national government and private resources; venture capital, partnerships with commercialisation of the project.) Trinidad and Tobago report state funding. Barbados reports funding, as intertwined with technological issues, is a “serious challenge in putting the basic infrastructure in place”.

Africa. Many projects are funded collaboratively by state governments and funding from donor agencies, AIDS/HIV/ART funds, with wide variation in dollar amounts (beginning at US\$17,000). Donor agencies are reported in Botswana (HIV/AIDS funding); Gambia (WHO); research funding and aid in Uganda, Zambia (CDC-US State funding, and multiple funding sources in Mozambique.

Asia. Difficulties are reported by Bangladesh and Sri Lanka in funding all possible programmes, difficulty in training staff and overburdened staff do not have time to participate. High costs require compromises, as illustrated by the statement in the report from Bangladesh: “The country needed to compromise with this (financial) reality and limit ambition within manageable level.”

Technological Challenges

4.8 The most prevalent technological problems are lack of infrastructure, low bandwidth and lack of interoperability across systems within and among regions, and staff training in ICT. Cyprus summarises the challenges:

“The lack of interoperability between current systems and administrations presents a big barrier in the development of the planned unification of the EHR. A robust gateway architecture is still needed providing the ability to exchange and process data in a meaningful manner, essentially based on standardised data models and elements, common protocols for exchanging data and metadata standards, a prerequisite for which is the use of a uniform syntax. The architecture should also incorporate identity management, authentication, trust, security, data protection, etc. Standard activities and processes must be associated with baseline metrics.”

4.9 These are compounded with financial and geographical challenges, as Cook Islands points out that:

“Training ... had to be conducted which meant that healthcare workers from the outer islands had to be flown in or System Administrators flown out to these outer islands on an all expenses paid trip by CIMOH...”.

4.10 Also included in technological challenges is the more subtle issue of staff or political resistance to technology. For example, in Uganda resistance to the initiative is reported because: “This was viewed as additional work without remuneration and technophobia especially among the elderly and those in remote areas.”

4.11 Similarly in Jamaica, “ ‘technophobia’ among policy makers in lead agencies” is reported as a technological challenge: “We need to perceive technology as an additional tool to facilitate improved efficiency in the delivery of health care and not as a ‘monster’ waiting to expose us.”

4.12 Overcoming these challenges, training staff and then maintaining technology can be prohibitive to e-health programs in some non-industrialized countries. Further, some technological issues overlap with ethical issues, for example, storage and access to sensitive medical information complicates the technological needs and can further add to staff training costs. Singapore, for example, cites the challenges of maintaining timely data and efficient decision-making when storage of sensitive information is prohibited and some medical conditions (e.g. STDs) are excluded from records.

4.13 Communication across health organisations, jurisdictions and professions is challenged by a lack of standardized terminology. This is identified and addressed by the use of SNOMED-CT in some countries (Australia, Canada), access to web-based clinical databases. Some countries (e.g., Cyprus) are investigating buying software that will overcome interoperability challenges. Specific projects and software applications carried

their own technological challenges, but technological challenges, noted in all regions (but not all countries), are:

- inadequate infrastructure – telephone lines, fibre optics and bandwidth
- need for standards
- need for interoperability, software applications; information exchange;
- high costs of start-up equipment, training and maintenance.

Ethical and Legal/Regulatory Challenges

4.14 Ethical issues are consistently linked to legal frameworks surrounding acceptability and use of electronic information. Of the 17 respondents who mentioned ethical challenges, the predominant issue is patient privacy and confidentiality of medical records (Annex 2). The key ethical issues are:

- consent
- confidentiality
- secondary use of data
- acceptability of electronic signatures.

4.15 Legal and policy frameworks are being developed to address the issues, e.g., New Zealand's Health Information Strategy Action Committee, and the Pan-Canadian Health Information and Privacy and Confidentiality Framework. Zambia has introduced a pledge of confidentiality form linked to the SmartCard, and other countries stress legal frameworks regarding the secure storage of data, e.g., Singapore. Apart from professional accessibility to information, patient accessibility to services also emerges as an issue in some countries. For example, the SmartCard in Zambia carries high replacement fees; services for patients and professionals in Canada must be translated into both official languages and in some cases to Aboriginal languages; in England patients can book their own hospital appointments; and resistance to non-handwritten prescriptions and signatures was specifically mentioned as a challenge to e-health in one region of Jamaica.

5. OUTCOMES

5.1 The range of initiatives is reflected in variation in outcomes. Not all respondents offered evaluated evidence of outcomes; responses often included reports of goals and process, rather than final outcomes (Annex 3). This is understandable given the early stages of most initiatives and the challenges outlined above. Common themes in responses on outcomes included improvements in:

- communication
- decision-making
- access to information.

5.2 Some countries also indicated that e-health initiatives serve to educate policy makers and health care providers about the advantages of using technology (Uganda, Bangladesh).

5.3 Specific outcomes include:

- development of standards and interoperability applications
- Implementation of telemedicine and telehealth programmes
- Communication between health care providers, including pharmacists, labs, and hospitals and other health care providers

- Laboratory and picture archiving communications
- Surveillance and database improvements
- Improved communication with donors
- Training of health care workers in ICT
- Reduced staff workload and paper use.

6. DISCUSSION

6.1 As might be expected, a wide range of initiatives results in disparate outcomes. The overall picture, however, indicates that a large number of member states are moving forward with innovative national and local programs which, in some cases, are keeping pace or exceeding those of larger and better funded jurisdictions.

6.2 For example, while countries with large budgets and human resources highly skilled in ICT have initiated complex national (and international) programmes, the SmartCard in Zambia represents the type of portable EHR that other countries are aiming towards. Such “lighthouse” programs exemplify the rich diversity and lessons to be shared across the Commonwealth.

6.3 Several findings suggest common experiences and interests across the Commonwealth:

- The ethical/legal challenges of e-health implementation;
- The technical challenges of infrastructure and interoperability;
- The financial challenges of equipment, human resource training and maintenance; and
- The need to raise awareness among policy makers, health care providers, and health care consumers.

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ANNEX 1

Commonwealth Survey on E-Health Initiatives - Project Descriptions

Country/Region	
AFRICA	
Botswana	Integrated Patient Management System 2003 – pilot 4 hospitals, 16 clinics, including laboratories, pharmacies.
Sierra Leone	Sierra Leone Integrated Data System: National Integrated Data System: National Integrated Data Repository currently underway.
The Gambia	24 schools in e-learning initiative t which include health issues, 2007.
Malawi	Installing broadband wireless network in government offices.
Mozambique	Set up Ministry of Health portal: policy, guidance, database.
Uganda	Many including, “Enhanced Access to Health Service and Information through ICTs” 2000-2003.
Zambia	‘SmartCare’ - EMR on ‘credit card’ linked to Patient Information Systems, component of ART care system
ASIA	
Bangladesh	Ministry of Health & Family Welfare: Health service data exchange & monitoring; annual surveys; telemedicine; e-records; rural health information system. 1998 & 2003.
Singapore	EMR Exchange between Health Care clusters 2004, '06 national database; '07 beyond public hospitals.
Sri Lanka	Description of use of computers/ICT in Ministry of Health.
CARIBBEAN	
Jamaica	Regional differences across 4 health regions – none in NE, SE, Foodhandlers database; South IT net HC services UNIMEDICS web based EHR System.
Trinidad & Tobago	Starting National Health Information System.
St. Kitts	None
Grenada	Installing computer network and computerisation of health data.
Barbados	Task force in place, drafting policy and strategy.
EUROPE AND CANADA	
England	National Programme for IT connects all NHS organisations, provides infrastructure, HER, treatment service, patient controlled hospital appointments, picture archiving and communication system.
Malta	E-Health portal, Integrated Healthcare Information System being developed with government network infrastructure
Cyprus	Health Care Information Support, 1) Request for proposal for turnkey software applications for initial computerisation of 2 hospitals, 2006. 2) RFP national health monitoring sys 2005-2007 – database, insurance, networks EHRs, etc. – to all hospitals by 2010.
Canada	Infoway – 2001 state funded NFP corporation; Federal/Provincial/Territorial collaborative health information, communication technology, EHRs

PACIFIC REGION	
Australia	1) East Goldfields Regional Reference Sites, 2005 – virtual practice network health care providers in region 2) National E-Health Transition Authority (NEHTA) 2005 – state funded NFP company all jurisdictions; Clinical information, medical product directory, consent framework, HER specifications, standards, implementation.
New Zealand	Health Information Strategy NZ HIS-NZ. 2005 Action Committee, 12 Action Zones – information sharing, e-pharmacies, e-laboratories, e-referrals, chronic care disease management.
Cook Islands	MEDTECH32 – centralisation of medical records, creates single database
Papua, New Guinea	n/a systems not installed

Commonwealth Survey on E-Health Initiatives - Ethical Issues

Country/Region	
AFRICA	
Botswana	Patient data confidentiality, authenticity of system generated prescriptions, electronic data interchange (EDI) between the different hospitals without manual forms, and the electronic signature.
Sierra Leone	n/a
The Gambia	n/a
Malawi	n/a
Mozambique	Accessibility of information– structure and protocols
Uganda	<ul style="list-style-type: none"> • “External doctors from another environment advising as third party professionals without consent of the patients. • Security during teleconsultation and transfer of patient information. • Involvement of non-medical providers especially technical IT staff and information managers • Health workers more aware of the need for addressing ethical issues and there are ongoing discussion in different fora.”
Zambia	Introduction of a pledge of confidentiality form.
ASIA	
Bangladesh	“‘e-patient records’ is still not in a stage to raise any ethical debate. ‘Personnel MIS database’ is maintained in secured server and only available to the personnel managers. Privacy of data is strictly maintained. Therefore, ethical issue is not yet a problem.”
Singapore	Exclusion of sensitive information such as HIV and STD status from being shared through the EMRX. Only health care professionals who are directly involved.
Sri Lanka	Confidentiality of information
CARIBBEAN	
Jamaica	Storage and use of signatures.
Trinidad & Tobago	Ownership of the patient health records and remote access to it with the corresponding security scheme.
St. Kitts	n/a
Grenada	n/a
Barbados	None yet
EUROPE AND CANADA	
England	Consent issues – opt-in or opt-out models; access to personal information (development of Smartcard, systems access security, audit trails)
Malta	Sensitive changes to legal status of a citizen
Cyprus	Security and privacy; patients and doctors hesitant to use new technology
Canada	Privacy and the protection of personal health information

PACIFIC	
Australia	<ul style="list-style-type: none"> • Robust consent framework is being designed to ensure that consumers participating in e-health initiatives are given a realistic expectation of potential uses and disclosures of their personal health information and assured that their privacy will be protected at all times. • People will be able to choose to participate in the Unique Health Identifier (UHI) service and use of individual identifiers will not be required to access health services.
New Zealand	<ul style="list-style-type: none"> • the extent of a patient's health record required by an emergency department when a patient is admitted unconscious, that is, whether they need to receive the patient's full medical history or just what is current and relevant; • the secondary use of health information outside the scope of improving health outcomes, for example, by other government departments and for insurance purposes; and • medico-legal questions around the division of responsibility between healthcare professionals; for example, if GPs are informed that patients have not had medications dispensed, what, if any, are their medico-legal and ethical responsibilities to act.
Cook Islands	The type of patient information that healthcare workers in certain sectors of the CIMOH have access to.
Papua, New Guinea	n/a

Commonwealth Survey on E-Health Initiatives: Outcomes

Country/Region	
AFRICA	
Botswana	Evaluated – successful in laboratory and microbiology test results; corrections being made elsewhere
Sierra Leone	n/a
The Gambia	n/a
Malawi	Anticipate improved information exchange and decision-making
Mozambique	Lists 12 projects, including pilots and routine use of databases, surveillance systems, and Ministry of Health portal. Outcomes include improved communications, databases, access to information, automatised drug management, “transparency and efficiency in the financial and logistics procedures”.
Uganda	<p>“Raised awareness among policy makers leading to the appointment of the National E-Health Steering Committee - an advisory and supervisory body.</p> <ul style="list-style-type: none"> • Formulation of a national e-health policy, strategy and implementation which are in the final stage and led by the National E-health Committee. • Policy committing Ministry of Health to use of ITs to improve healthcare delivery while addressing issues of sustainability. • Increased computer and internet use among health workers. ... increased demand for computer training and more computers for health workers especially among the young ones. • Development of IT based Continuing Medical Education (CME) material and training on content creation and multimedia development. • Health worker interaction through the Health Node which was established. • Human resource capacity built in the use of ICTs for health”.
Zambia	Reduced staff workload, improved confidentiality, reduced paperwork; 15000 Care Cards nationwide, 45 sites.
ASIA	
Bangladesh	<p>“Personnel managers are being able to take quicker decisions with respect to personnel placement.</p> <ul style="list-style-type: none"> • Better monitoring of progress of health programmes and achievements of health MDGs • Increasing understanding of the importance of e-health by the policy makers which led MOHFW to launch a project for assessment of existing HIS and developing a plan for future HIS with support from Health Metrics Network (WHO HQ, Geneva) with a view to build a comprehensive and integrated infrastructure of HIS and e-health.”

Singapore	EMRX leads to faster better clinic decision-making
Sri Lanka	Improved communication internally and with donor community; rapid access to health information, reduced clerical work.
CARIBBEAN	
Jamaica	<ul style="list-style-type: none"> • Same foodhandlers system evaluated in Belize and found improved customer satisfaction; improved data capture and analysis; reduction in fraudulent use of the card, and in other illegal operations; income generation. • South – infrastructure not yet established; • EHR system, Telemedicine – to be evaluated.
Trinidad & Tobago	n/a
St. Kitts	n/a
Grenada	n/a
Barbados	n/a
EUROPE AND CANADA	
England	“secure national network, the roll out of new patient administration and clinical systems, and all of the other National Programme achievements are now supporting the NHS to provide faster, more convenient and more effective services. Examples include: Choose and Book...; the Electronic Prescription Service...; Picture Archiving and Communications Systems...; GP2GP - a system which enables patients’ electronic health records to be transferred directly and securely between GP practices...; NHS Care Records Service ...; New National Network (N3) - over 21,000 secure broadband connections have been installed, including 11,000 in primary care locations”.
Malta	The IntegHcare InfoSys - first six applications (including Lab Info System, Radiology Information Systems, Picture Archiving Communication Systems E-Health portal (is) ...main communication interface between the citizen, the health professional and the health service for applications such as the online application for a European Health Insurance Card amongst others.
Cyprus	Pilot projects only – 1) coordination of home care for cancer patients, provider access to information; 2) Emergency services portable medical device for emergencies telemedicine.
Canada	Expanding provincial/territories’ telehealth, including in Aboriginal languages. Expect fully interoperable EHR for 50 per cent of population in 2010.
PACIFIC	
Australia	EGRRS – model for Health professionals communication and infrastructure NEHTA – standards for hospital discharge summaries; begin UHI work; standards for e-health messaging and identification of medicines.
New Zealand	“too early [but]- National Health Identifier (NHI), which was established in 1976, has been fully electronic since 1992; ...a national register of patient immunisations; Health Information Network allows

	online management reporting from national collections to district health boards; ...1000 practitioner organisations connected to a secure Health Network for the exchange of secure health information; ..Health Information Standards Organisation has recently developed a range of important national standards to support increased information sharing amongst healthcare providers; ...Almost all ...laboratories electronically transmit test results back to general practitioners who order the tests; Government investment in a number of the HIS-NZ Action Zones; ...greater collaboration across the health sector”.
Cook Islands	More accurate reporting, speed of accessibility, better analysis of health statistics
Papua, New Guinea	n/a

[Note Botswana’s summary of tech challenges also possible as a case study:

“For the system to be operational the initiative required a networking infrastructure that supports a centralised database. During its implementation the Government Data Network (GDN) was used for the deployment of this system.

However bandwidth was found to be a challenging factor for the sites to connect to the GDN. The Botswana Telecommunication Corporation (BTC), who provided leased lines from sites to the GDN, could not meet some of the minimum bandwidth requirements due to technological deficiencies more especially to those sites which are not on the GDN fibre optic backbone. The minimum speed required was 256 KB but in some sites BTC could only provide 64KB at its best. This challenge has resulted in an unsatisfactory system response time.

The other challenges related to human resource development for both user and the provider. Users lacked basic computer training/skills and the ministry of health did not have enough staff with adequate IT skills to support the system.

Also some of the laboratory instruments could not be interfaced to the system as they were in the process of being replaced or were unable to communicate electronically with any other system.”]

ATTACHMENT 1

**A SURVEY OF E-HEALTH INITIATIVES
ACROSS THE COMMONWEALTH**

Country Responses



Australia



Describe a successful or challenging e-health initiative your country has taken.

Eastern Goldfields Regional Reference Site (EGRRS)

One particular project that has been undertaken by the Australian Government Department of Health and Ageing is the Eastern Goldfields Regional Reference Site (EGRRS), which was established to measure the benefits to health care providers of having high-speed, continuous, high-quality broadband connectivity.

The project was able to demonstrate the value of a selection of key health services and applications that can be delivered by advanced broadband arrangements – an Internet Protocol (IP) Virtual Private Network (VPN). A VPN is a high-speed, always on, secure and high performance network service that is capable of transmitting large amounts of data and which provides secure connectivity for phone, data, and video applications.

The Reference Site covered the area serviced by the Eastern Goldfields Medical Division of General Practice (EGMDGP) and Goldfields South East Health Region in Western Australia (WA). This area includes the City of Kalgoorlie-Boulder and the surrounding region, from the inland town of Wiluna in the north, to the coastal town of Esperance in the south, covering 815,464 sq. kilometres (approximately 32.6 per cent of the land mass of Western Australia (WA)). The population covered by EGRRS is 59,208. The area covers typical rural and remote conditions in Australia, with the City of Kalgoorlie-Boulder mirroring metro-like conditions.

Core infrastructure for the project was deployed in February 2005, and the Reference Site went 'live' in March 2005. The EGRRS project was completed on 30 June 2006.

The VPN connected GP practices and homes, medical specialists, Kalgoorlie Regional Hospital, Esperance District Hospital, Aboriginal Community Controlled Health Services (ACCHS), the EGMDGP, the Rural Clinical School and local pharmacies and aged care facilities, and included secure gateway connections to the Royal Flying Doctor Service network, and private radiology and pathology providers.

The EGRRS project participants received the following services:

- ✦ *access to secure broadband connectivity to both their practice rooms/office (via direct cable connection or satellite technology, depending on location) and the private residences of clinicians*
- ✦ *provision of a secure email service including spam filtering*
- ✦ *secure internet access, including firewall, antivirus and filtering services*
- ✦ *secure data transfer*
- ✦ *remote access capability from sites within the VPN*
- ✦ *desktop videoconferencing capability*
- ✦ *Voice over Internet Protocol (VoIP) telephony*
- ✦ *the ability to use Medicare Online claiming*
- ✦ *the ability to receive electronic radiology and pathology reports.*

A panel of EGRRS network participants identified the following types of additional applications for use on the VPN that were accessed through a 'GoldHealth' portal:

- ✦ *electronic discharge summaries*
- ✦ *electronic reports from specialists*
- ✦ *online education applications and peer support*
- ✦ *online therapeutic guidelines, journals, resources and information services*

- ✦ *clinical applications (e.g. Teledermatology)*
- ✦ *small business tools that demonstrated the value of broadband.*

Wider e-health environment – National E-Health Transition Authority (NEHTA)

The development of e-health standards is being undertaken by the National E-Health Transition Authority (NEHTA). NEHTA is a not-for-profit company, limited by guarantee, which was established by the Australian, state and territory governments on 5 July 2005 to develop the critical standards, infrastructure, software and systems required to support the connectivity and interoperability of electronic health information systems across Australia.

NEHTA has a specific work programme, which has been agreed to and funded by all jurisdictions (Commonwealth, state and territory governments). The baseline activities funded in 2005-06 into 2007-08 include:

- ✦ *The development of clinical information*
- ✦ *Clinical terminologies*
- ✦ *Individual Healthcare Identifier (IHI)*
- ✦ *Healthcare Provider Identifier (HPI)*
- ✦ *Medical product directory*
- ✦ *Supply chain efficiency*
- ✦ *Interoperability framework; secure messaging*
- ✦ *User authentication*
- ✦ *E-health consent framework*
- ✦ *Electronic Health Record (EHR) specifications*
- ✦ *Standards implementation.*

The Council of Australian Governments (COAG) announced funding of \$130.2 million on 10 February 2006 for NEHTA to support accelerated work on priority e-health building blocks.

Jurisdictions have supported the introduction of standardised clinical terminologies, which provide the “language” for electronic information exchange in health. This allows healthcare providers to speak the same language when sharing patient information across the ether. This is where the SNOMED-CT (Systematized Nomenclature of Medicine – Clinical Terms) comes in. This internationally accepted standard is being adopted across the Australian health system under the guidance of NEHTA.

NEHTA is the Australian representative within the International Health Terminology Standards Development Organisation (IHTSDO), and will function as the Australian National Release Centre with responsibility for managing the flow of information between the IHTSDO and Australian users of SNOMED-CT. NEHTA has secured a national license for the use of SNOMED clinical terms, and access to the standard has been free for Australians since April 2007.

What were the financial challenges and costs associated with implementation of this programme?

EGRRS

The 2003-04 Federal Budget allocated \$9.2 million in funding to the ‘Access to Broadband Technology Initiative’ (which evolved into the Broadband for Health programme). A demonstration of the actual value gained by broadband connectivity was the key, agreed objective of this initiative. As such, a component of this funding allocation was used to implement the EGRRS project.

A total of \$4.76 million was expended to implement EGRRS. Primarily, the funding was used for VPN equipment purchasing and VPN management services. It also was used to upgrade participants’ existing hardware and software as required and for local project management and support services.

From 1 July 2006, EGRRS transitioned to the locally owned 'GoldHealth' private network with over 90 per cent of all original EGRRS participants (over 230 users) continuing with the network. The GoldHealth Network continues to be supported by the EGMDGP.

Wider e-health environment – NEHTA

Investment in the development of e-health standards is being shared by the Commonwealth, state and territory governments; a national approach was needed to develop the critical standards, infrastructure, software and systems required to support the connectivity and interoperability of electronic health information systems across Australia.

NEHTA is funded by jurisdictions according to the Australian Health Ministers Advisory Council (AHMAC) cost sharing formula, whereby the Commonwealth provides 50 per cent of funding and the states and territories combined provide 50 per cent. The Health Ministers agreed to provide NEHTA with \$18.2 million in base level funding for project activities from 2005-2008.

- ✦ The Commonwealth also funded NEHTA to undertake work on the Australian Catalogue of Medicines (ACOM) and the Shared Electronic Health Record (SEHR) initiatives.

On 10 February 2006, the Council of Australian Governments (COAG) agreed to provide NEHTA with an additional \$130.2 million over three years, commencing from 2006-07 to develop, implement and operate systems to manage:

- ✦ an Individual Healthcare Identifier (IHI) (\$45.1 million)
- ✦ a Healthcare Provider Identifier (HPI) (\$53.1 million)
- ✦ Clinical Terminologies (SNOMED-CT) (\$32.0 million).

What have been the main technological challenges to implementing e-health in your country?

Structural challenges

The nature of health service delivery in Australia presents slightly different challenges to other Commonwealth nations for managing investment in e-health implementation. Australia's health system is very diverse, and very structurally complex in comparison to many other Commonwealth countries. This diversity and complexity requires a greater level of cooperation and negotiation to progress the e-health agenda. Some examples of these differences are as follows.

- ✦ Australia has a strong federal system of government, with differing levels of responsibilities. The Australian Government has the primary role of developing broad national policies, regulation and funding while state and territory governments are primarily responsible for the delivery and management of public health services (including public hospitals) and for maintaining direct relationships with most health care providers, including regulation of health professionals and private hospitals.
- ✦ Funding for health services is predominantly the preserve of governments. National programmes such as the Medicare Benefits Schedule (MBS) and Pharmaceutical Benefits Scheme (PBS) are funded by the Commonwealth Government. States and territories fund their public hospitals. There is also a proportion of total Australian health expenditure that is purely private expenditure and for private health insurance services not covered by government-funded services.
- ✦ Australia also has a strongly independent health workforce, with most general practitioners operating in the private sector on a fee-for-service basis. While government-run hospitals employ doctors on salary, doctors (as a rule) are not employed by governments. Australia's medical specialist workforce is also principally private operators. Likewise, there has been significant growth in the private hospital sector.
- ✦ Australia also faces geographic challenges. While most of the Australian population live in urban areas near Australia's coastline, there are great challenges in providing adequate levels of health services for Australians living in regional and remote Australia.

- ✦ *This geographical challenge is evidenced by the difficulties in provision of improved broadband infrastructure across the nation, ensuring that all Australians have fair and reasonable access to broadband and its benefits, particularly with regards to price and location barriers.*
- ✦ *The National Broadband Strategy (announced in 2004) provides a policy framework for broadband development in Australia agreed by all levels of government, which included the recently completed Broadband for Health programme. A major emphasis of these funding programmes is to provide access to affordable broadband services in regional Australia. Government services, the community and sectors such as education and health are also being targeted for broadband development.*
- ✦ *The strong support from general practices and community pharmacies in accessing the Broadband for Health initiative has seen a significant take-up of secure business-grade broadband services that will underpin the future exchange of health information.*

Technical challenges

To be able to have an effective e-health system providing key information at the point of care, the system needs to have a strong set of standards to promote the interoperability of health systems that will ensure that clinical records can be safely and securely exchanged between approved health professionals at different points within the continuum of care. The Australian Government and the governments of all states and territories have agreed that a collaborative national approach is essential to accelerate the e-health agenda to achieve desired health system reforms.

The partnership between the Australian Government and all jurisdictions in e-health represents significant strategic influence over future developments. This collaborative approach in Australia is often necessary due to the absence of market forces to generate viable sustainable markets, most notably in the health sector. As a consequence, governments in Australia often play a major role in developing markets and providing financial incentives.

The work being undertaken by NEHTA in e-health standards development, and NEHTA's lead role in developing and implementing the Unique Health Identifier (UHI) service, will underpin the development of e-health in Australia. It should also be noted that notwithstanding the work being undertaken by governments in supporting the development of e-health standards and key infrastructure, there will continue to be differing levels of technology take-up by health professionals.

- ✦ *General practice has been the success story in Australia for its embrace of information technology through accessing the Information Management Information Technology (IM/IT) incentive in the Practice Incentives Program.*

Have any ethical issues been raised during the design and implementation of e-health programmes?

Privacy

A robust consent framework is being designed to ensure that consumers participating in e-health initiatives are given a realistic expectation of potential uses and disclosures of their personal health information, and are assured that their privacy will be protected at all times.

People will be able to choose to participate in the Unique Health Identifier (UHI) service and use of individual identifiers will not be required to access health services.

The consensus reached by all Australian jurisdictions (Commonwealth, state and territory governments) is that a consistent health privacy regime will not provide sufficient certainty to enable e-health systems to operate, and that particular initiatives – including the UHI service – will require Commonwealth legislation to authorise their establishment.

Privacy considerations will be a key component of the National Health Information Regulatory Framework (NHIRF) being developed, and referred to more fully as part of Question 6.

Public / private ownership of services, systems etc.

Australia's health system has developed as a hybrid of public and private delivery of health services:

- ✦ Acute care hospitals are run by state governments, and are provided with supplementary Federal financial assistance through the Australian Health Care Agreements (ACHAs), where the Commonwealth provides approximately 50 per cent of the running costs
- ✦ The Commonwealth government provides assistance to the primary care sector through national programmes such as the Medicare Benefits Scheme (MBS), and the Pharmaceutical Benefits Scheme (PBS)
- ✦ There is a robust Australian private health sector. General practitioners are independent operators, as are Australia's medical specialist workforce. Australia's private hospital network operates alongside the public-run system
- ✦ There is support for private health insurance, with the Federal Government providing a rebate to promote use of private health services.

Secondary use of data

In principle, secondary use of health information (e.g. for research and population health purposes) will be permitted under tight controls. While the primary purpose for collecting health information electronically is for the healthcare treatment of the individual, secondary uses of e-health data may be permitted in accordance with agreed ethics and privacy safeguards.

- ✦ An example of a secondary use is population health research. The majority of such uses are expected to involve de-identified information.

The Department of Health and Ageing is working with all states and territories to develop a best practice protocol for the linkage and de-identification of data to ensure appropriate handling at all times.

Has the implementation of e-health programmes required any legal or regulatory changes?

ePrescribing

In order to remove Commonwealth legislative barriers to electronic prescribing and dispensing, the Department has amended the National Health (Pharmaceutical Benefits) Regulations. These amendments came into effect from 1 March 2007, and provide the legislative platform for the introduction of an alternative electronic prescribing and dispensing process that will be additional and separate to the existing paper-based prescribing and dispensing process.

States and territories are currently taking steps to remove any legislative barriers to electronic prescribing and dispensing in each jurisdiction.

In order to manage key stakeholder expectations, the Department is conducting consultations with key stakeholders including peak bodies covering doctors, pharmacists, health consumers and the software industry to provide information and an opportunity for input to national solutions development.

National Health Information Regulatory Framework

In July 2007, the Australian Health Ministers Conference (AHMC) agreed to develop a comprehensive regulatory framework designed to provide strong privacy protection for health information on a national basis. The key elements of the framework include:

- ✦ legal authority for the establishment and implementation of UHIs for individuals, healthcare providers and provider organisations, including to prohibit their use outside healthcare settings
- ✦ uniform national health privacy law based around the national health privacy principles in the draft national health privacy code
- ✦ national arrangements to undertake functions relevant to the operation of the regulatory framework.

It is expected that the legislation will be introduced for consideration by Parliament in late 2008 or early 2009.

What have been the outcomes of your e-health initiatives?

EGRRS

Some of the project's most notable achievements are that:

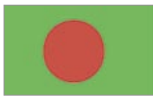
- ✦ *EGRRS demonstrated the value to health professionals of having access to high quality broadband connectivity through a private managed network*
- ✦ *EGRRS engaged a community of health professionals across the region to participate in the project resulting in an ongoing commitment to the health network*
- ✦ *The lessons learnt from EGRRS were used to inform policy development for the Managed Health Network Grants as part of the Broadband for Health Program*
- ✦ *EGRRS has resulted in increased communication and collaboration between health professionals that are connected to the network across the region*
- ✦ *EGRRS was recognised nationally as a project of significance and was the recipient of the 'Best Communications Solution – Regional' from the Australian Telecommunications User Group (ATUG) in March 2006*
- ✦ *the EGRRS project established the infrastructure and security that enables participation in e-health activities.*

Wider e-health environment – NEHTA

NEHTA has made good progress since its establishment delivering a number of key activities. These include:

- ✦ *publishing the standards for electronic hospital discharge summaries*
- ✦ *commencing work with Medicare Australia on the Unique Health Identifier (UHI) project*
- ✦ *publishing the standards for secure electronic health messaging and identification of medications.*

NEHTA is reporting to all jurisdictions on their progress against their agreed deliverables.



Bangladesh



Kindly describe a successful or challenging e-health initiative your country has taken.

The Government of Bangladesh has a wide range of specific programmes to gradually improve the e-health infrastructure and its use in the country. It includes administration and management of health services, collection and exchange of health service data, performance analysis of vertical programmes, population surveys, professional communication, supporting medical education and research, telemedicine, e-records, etc. In fact, the e-health initiative in Bangladesh began in 1998 when the Ministry of Health & Family Welfare (MOHFW) undertook the Health & Population Sector Programme (HPSP) to enhance efficiency of programme implementation. Under the HPSP, all health and population-based activities were listed and grouped in different lines or sectors. One Line Director was assigned to look after each sector. The major responsibility of e-health implementation in the health services went to Line Director of MIS (health). Other Line Directors – such as Line Director (pre-service and medical education), Line Director (planning and research), Line Director (hospital) and other Line Directors for vertical programmes – also shared some responsibilities in their respective fields. In 2003, the HPSP was revised and renamed the Health, Nutrition and Population Sector Programme (HNPSPP) with a new Operational Plan (OP) for FY2003-2010. Current e-health activities are thus being implemented under HNPSPP FY2003-2010 OP.

The Line Director, MIS (health) is responsible for (a) the collection and exchange of health service data across all service delivery points, health managers at different tiers, and officials at MOHFW to support monitoring of progress of health programmes and policy decisions; (b) conducting annual household survey (Geographical Reconnaissance or GR) personnel, logistic and financial MIS; (c) telemedicine; and (d) e-records, etc. Computers have been provided to the MOHFW, central store for medical supplies (national level), all national and regional tertiary hospitals, 64 district health managers and most of the 464 sub-district hospitals. These computers are connected through the internet. Hospital-based service data is still collected in formats compiled locally with limited possibility of desegregation. Domiciliary data collected by field health workers is compiled at sub-district health offices and sent to MIS-HQ in Dhaka. Annual GR data is collected on each household and also processed at MIS-HQ. The Health Service Personnel Database is being routinely used during the placement of health personnel. Financial MIS and logistic MIS are still in the developmental phase.

The Director, MIS (health) has an ambitious plan to establish telemedicine centres in several key tertiary care and specialised hospitals, with links to selected remote district and sub-district hospitals. However, this is still in the planning phase.

The introduction of e-records for each patient in the hospital is difficult in the public sector hospitals of Bangladesh. The principle reason is huge patient load and scarcity of human and ICT resources. In Bangladesh, there is no staff for clinical clerkship in the patient wards, which is a problem in many countries. Doctors and nurses remain heavily engaged in patient services and can give little attention towards maintaining quality patient records. The country is not financially able to provide a computer to each ward of all hospitals immediately. It is more difficult to maintain computer-based patient registers at the outpatient level because OPD doctors can hardly give an average of five minutes to see a patient in the OPD. Recently, few above-average-cost private hospitals have started electronic patient record systems. But, similar systems would be challenging to introduce in other public and average private hospitals. The MOHFW is currently conducting a project under the support of Health Metrics Network (WHO-HQ) to assess the Health Information System (HIS) of Bangladesh and develop a plan for future HIS in the country. This project will examine, amongst other issues, how to introduce e-record systems in the country. The National Institute of Cardiovascular Diseases (NICVD), Dhaka (a public sector hospital) runs an admission e-record database. For about a year, a biochemistry lab e-record database has been in operation satisfactorily in the same institute, which eliminated paper-based registers.

The Line Director (pre-service and medical education) provided computers, printers and multimedia systems to the medical institutions to support teachers in preparing and presenting educational materials, processing students' assessment records, doing data entry and analysis, gathering information from the internet, and communicating

with other professionals. The Line Director (planning and research) supported the creation of facilities for MEDLINE and POPLINE services, Bangladesh Medical Index services, internet access services, data entry and analysis facilities, etc. The Line Director (hospital) provided computers to different hospitals to support better hospital management. The Line Directors of different vertical programmes used ICT in various ways for record-keeping, performance analysis and data communication.

What were the financial challenges and costs associated with implementation of this programme?

Implementation of a reasonable e-health infrastructure would require large numbers of computers and ICT equipment, software, computer-literate staff, troubleshooting technicians, internet costs, etc. The country needed to compromise with this reality and limit expectations to a manageable level. The Line Director (MIS) has estimated that a total of US\$8.5 million will be required during FY2003-2010, of which US\$4.3 million will be recurrent expenditure and US\$4.2 million will be capital investment.

What have been the main technological challenges to implement e-health in the country?

- ✘ Financial constraints preventing the purchase of an appropriate number and type of ICT equipment
- ✘ Unavailability of adequate number of computer-literate employees to implement e-health
- ✘ Recruitment of separate ICT workforce is not possible due to finances
- ✘ Long-prevailing weaknesses in quality record-keeping, as well as inertia for improving
- ✘ Huge patient loads prevent the limited number of hospital staff from maintaining proper e-records
- ✘ Weak internet backbone and high internet access cost
- ✘ Weaknesses in conceptualisation of the e-health framework (data need, hardware, software, analysis technique, transmission, utilisation, etc.).

Have any ethical issues been raised during the design and implementation of e-health programmes?

E-patient records are not yet in a stage to raise any ethical debate. The personnel MIS database is maintained in a secured server and only available to the personnel managers. Privacy of data is strictly maintained. Therefore, ethical issues are not yet a problem.

Has the implementation of e-health programmes required any legal or regulatory changes?

Until now, the MOHFW did not feel such need.

What have been the outcomes of your e-health initiatives?

- (a) Personnel managers are able to make decisions more quickly with respect to personnel placement
- (b) Better monitoring of the progress of health programmes and achievements of health MDGs
- (c) Increasing understanding of the importance of e-health by the policy-makers, which led MOHFW to launch a project for the assessment of existing HIS and developing a plan for future HIS with support from Health Metrics Network (WHO HQ, Geneva), with the intention to build a comprehensive and integrated infrastructure of HIS and e-health.

List of all selected e-health initiatives and e-health contacts in Bangladesh

There are some innovative e-health initiatives in the country. Integrated Rural Health Information System (IRHIS) is one. IRHIS is trying to exploit the micro-credit finance mechanism to develop rural health insurance programmes through a network of 64 private and 64 public-sector rural health facilities. Its system is proposed to integrate M- or E-commerce, a messaging system, telemedicine, a lab info system, pharmacy retail, MIS and training, a data archive, communication and networking. The organisation projects many success factors in Bangladesh rural

areas, such as mass awareness on ICT; rapid expansion of mobile phone operation; the possibility of availing computer literate graduates; extensive presence of NGOs; existing micro-credit financing system; and growing health awareness of local people. One of the City Corporations of Bangladesh (Rajshahi) introduced an Electronic Birth Registration System (EBRS) that provides citizens a machine-readable electronic card to update and retrieve demographic, schooling and immunisation records. The card works as an incentive because without producing the card, citizens do not get healthcare, immunisation, primary education or other city-corporation services. D.Net (Development Research Network) is an NGO which is providing e-health services through their tele-centres. A telehealth employee moves from door-to-door and connects the otherwise out-of-reach families with quality health service via mobile communication to their head office in Dhaka, where doctors are available round-the-clock. During the President of Intel's recent visit to Bangladesh, he had the opportunity to witness a telehealth employee demonstration. The largest mobile operator in Bangladesh, the GrameenPhone, has joined with TeleNor enterprise to operate a round-the-clock e-health service, where subscribers can call a number to ask doctors for medical advice. The fee is higher than standard conversations and charged on a per-minute basis. The Diabetic Association of Bangladesh is piloting telemedicine services for patients from some selected remote centres. MEDINOVA, a diagnostic clinic, is running a commercial tele-medicine service to get medical advice from overseas doctors.



Barbados



Describe a successful or challenging e-health initiative your country has taken.

Barbados is now in the initial stages of implementing e-health. The Ministry of Health now has in place, a multi-disciplinary task force on Information Technology and Information Management. This body has responsibility for drafting and implementing strategy and policy for the Ministry. An information system reform initiative has begun both in primary and tertiary care.

What were the financial challenges and costs associated with implementation of this programme?

Lack of adequate financing has been a serious challenge in putting the basic infrastructure in place. Some financing is now being provided through the Barbados Health Sector Programme – 9th EDF.

What have been the main technological challenges to implementing e-health in your country?

No serious technological challenges have been encountered so far in the reform effort. There remains however an urgent need for the development of an information culture and an acceptance of staff to the whole process of change.

Have any ethical issues been raised during the design and implementation of e-health programmes?

None so far. It is anticipated that some critical issues will arise given the nature and type of information, i.e. medical records, patient-doctor confidentiality.

Have the implementation of e-health required any legal or regulatory changes?

It is anticipated that laws relating to the electronics storage and transfer of patient records and other legal documents will have to be revisited.

What have been the outcomes of your e-health initiatives?

The initiative has not yet reached implementation stage.



Botswana



Describe a successful or challenging e-health initiative your country has taken.

The Integrated Patient Management System is an initiative to have an electronic record of all patients that visit any government health facility. The project started in February 2003 in four hospitals and 16 clinics. These sites were used for piloting admissions, laboratory, electronic ambulatory record system, pharmacy, ordering entry, community wide scheduling microbiology, medical records index and enterprise record modules.

What were the financial challenges and costs associated with implementation of this programme?

The programme was sponsored through a donor agency under the HIV/AIDs programme. The tender requirement of this initiative stipulated a number of functions but at the contract stage some of these could not be undertaken due to donor financial limits. This constraint resulted in splitting the initiative into two phases – implementation of core modules mainly towards ARV treatment and implementation of other modules towards patient care not necessarily related to HIV/AIDs. Ultimately, due to this challenge, the full potential of the initiative has not been realised as more patient centred services have not been implemented.

What have been the main technological challenges to implementing e-health in your country?

For the system to be operational the initiative required a networking infrastructure that supports a centralised database. The Government Data Network (GDN) was used for the deployment of this system.

Bandwidth was found to be a challenging factor for the sites to connect to the GDN. The Botswana Telecommunication Corporation (BTC), who provided leased lines from sites to the GDN, could not meet some of the minimum bandwidth requirements due to technological deficiencies, especially to those sites which are not on the GDN fibre optic backbone. The minimum speed required was 256 KB but in some sites BTC could only provide 64KB at its best. This challenge has resulted in an unsatisfactory system response time.

Other challenges related to human resource development for both user and the provider. Users lacked basic computer skills and the Ministry of Health did not have enough staff with adequate IT skills to support the system. Furthermore, some of the laboratory instruments could not be interfaced to the system as they were in the process of being replaced or were unable to communicate electronically with any other system.

Have any ethical issues been raised during the design and implementation of e-health programmes?

A number of ethical issues were raised during the implementation of the system. Amongst them there were issues of patient data confidentiality, authenticity of system generated prescriptions, electronic data interchange (EDI) between the different hospitals without the manual forms, and the electronic signature. All the issues are still pending except the patient data confidentiality where controlled measures were put in place to guard against access of sensitive patient data to non-authorized personnel. Regarding EDI, data is verified against hand written order forms before action is taken on the transferred data. Currently the government through the Ministry of Communication Science and Technology is developing a legal framework to provide guidance on use and applicability of electronic data.

Has the implementation of e-health programmes required any legal or regulatory changes?

Currently the implementation of e-health has not resulted in or change in legislation or regulations. However, with the roll out of the system, it will facilitate the need for legislation/regulation in areas such as handling of electronic health data, usage and validity of the manual patient card, access to the centralised patient data by other health care providers other than the consulting provider.

What have been the outcomes of your e-health initiatives?

The initiative has just been evaluated and a list of issues and priority areas has been identified for corrective action. The initiative has been successful for laboratory and microbiology where test results are now fed into the system electronically and made available to the consulting health care provider. Once the gaps that have been identified by the evaluation are addressed, the system will be then be rolled out to the remaining facilities.



Canada



Describe a successful and challenging e-health initiative Canada has taken.

A major e-health initiative Canada has undertaken was the creation of Canada Health Infoway (Infoway) in 2001, following several years of related policy work. Canada Health Infoway is a federally-funded, independent, not-for-profit corporation with a mandate to accelerate the development and adoption of electronic health information systems with compatible standards and communications technologies on a pan-Canadian basis.

All jurisdictions in Canada are working together in the expectation that health I/Ts, such as electronic health records (EHRs), telehealth and public health surveillance systems, will significantly improve access to health care services, patient safety, quality of care and productivity. (Canada considers all of these areas and some other ICT tools to be part of e-health.)

Infoway is collaborating with the federal, provincial and territorial (F/P/T) governments towards a common goal of modernising Canada's health information systems. This collaborative approach reduces overall costs by coordinating efforts, avoiding duplication, taking advantage of economies of scale, replicating successful initiatives across the country and sharing best practices.

The creation of Infoway both expanded the use of telehealth and built the foundation for Canada's electronic health records system. Through its support of Infoway, the federal government seeks to build a health care system which is more accessible and sustainable and ultimately more responsive to the health needs of Canadians.

What were the financial challenges and costs associated with implementation of this programme?

Development of an interoperable, integrated electronic health record system in a decentralised federation with a small population (about 34 million) scattered throughout a country with a very large landmass that includes the far North, poses financial and other challenges.

To encourage participation, Infoway acts as a strategic investor, providing a portion of system development costs and project oversight while its provincial and territorial (P/T) partners in initiatives and projects are responsible for the actual system development, implementation and overall funding, including on-going operational costs.

To date, the following funding agreements between the Minister of Health and Infoway represent a total federal investment to date of C\$1.6 billion:

- ✦ 2001 – C\$500 million for EHRs and telehealth
- ✦ 2003 – C\$600 million additional support for EHRs and telehealth
- ✦ 2004 – C\$100 million for a pan-Canadian health surveillance network
- ✦ 2007 – C\$400 million for continued work in telehealth and EHRs, and to support wait times reductions.

As of December 31, 2007, Infoway has approved over C\$1.3 billion to support more than 240 Canadian projects.

What have been the main technological challenges in implementing e-health in your country?

The first major challenge was the need to define and develop a pan-Canadian standards-based business and technical EHR solutions architecture on which 14 different jurisdictions (Infoway Members), health system delivery organisations, vendors and clinicians could agree. Moreover, this architecture had to have the capacity to enable connectivity across approximately 40,000 points of service.

The business requirements and resulting architecture were innovative for the health care information technology industry. This meant that using existing solutions was problematic; quite simply, there were a limited number of 'off-the-shelf' solutions available that supported Canada's collective functional, technical and interoperability requirements. As a result, many vendors had to develop new solutions or do significant enhancement or customisation of existing solutions.

Developing and deploying the related standards has proven challenging as well. There were few standards which supported our business requirements and architecture already available that could simply be adopted. Thus, significant effort was needed to gather the detailed requirements for standards, develop the standards specifications, and finally to retrofit the applications to apply the standards. However, the efforts expended will facilitate interoperability and ensure the use of consistent terminology across the spectrum of solutions deployed. Interoperability, for the purpose of sharing a person's personal health information across a very diverse set of applications, is fundamental to the mission of Infoway on behalf of the jurisdictions and other key stakeholders they serve. This requires consistent implementation of software services and standards. The ability to test and certify system compliance with the interoperability standards remains a major challenge for Canada.

Another technological challenge in Canada is inadequate bandwidth, particularly in the North, and territories such as Nunavut. Essentially, the electronic capacity to support this work is missing in these areas, due to inadequate telephone line infrastructure. The lack of capacity is impeding progress on telehealth and electronic health records applications development, both of which, being information-intensive, require access to lines with considerable capacity. Enhanced capacity in these remote areas of Canada must be supplied by satellite, and this can be very costly. The situation is being reviewed by the federal government.

Have any ethical issues been raised during the design and implementation of e-health programmes?

As mentioned, Canada had been building the foundation for e-health for several years (1997-2000) prior to the creation of Infoway. This consultation work involved not only the provinces and territories on e-health, but also experts and stakeholders from across the country to participate in the e-health vision for the country.

From the outset, privacy and the protection of personal health information has been a key area of focus for these F/P/T consultations, and a key consideration for the development of Canada's e-health plans for electronic health records systems in particular. This concern resulted in early collaborative work toward harmonisation of F/PT legislation regarding personal health information in electronic format.

*The Pan-Canadian Health Information Privacy and Confidentiality Framework, endorsed in 2005, recommended core provisions for the collection, use and disclosure of personal health information. As Canada is now well along in the implementation of initiatives such as EHRs, governments at all levels remain acutely aware of the need to protect the personal health information of their citizens. A public opinion research initiative entitled *Electronic Health Information and Privacy: 'What Canadians Think 2007'**, released on 16th November, 2007, indicated that 88 per cent of Canadians support the implementation of EHRs. However, this support remains tightly linked to the need to safeguard the personal information contained in those records.*

Infoway provides expertise to support successful implementation of electronic health information solutions by its partners, as well as monitor projects to ensure cost and risk are well-managed. Dimensions of this work include: standards development, the EHR Blueprint, risk and quality assessments, and collaborative work on privacy. The latter includes a Privacy Forum where F/P/T Privacy Officers and representatives from health departments discuss privacy governance matters as they relate to electronic health information management on an ongoing basis.

* Health Canada, Canada Health Infoway and the Privacy Commission co-sponsored the survey.

Has the implementation of e-health programmes required any legal or regulatory changes?

Recognising the benefits of electronic prescribing, Health Canada undertook a review of its federal statutes to determine whether amendments would be required to enable electronic prescribing, a component of an interoperable EHR. The review resulted in the following decision: "Health Canada has determined that electronically generated and transmitted prescriptions are permissible to the extent that they achieve the same regulatory objectives as written prescriptions."

Another legal issue to consider in Canada is that it is a bilingual country; therefore there is a requirement that e-health initiatives and systems be produced in both official languages; English and French. One example can be seen in the decision to use the Systematised NOMenclature of MEDicine Clinical Terms (SNOMED CT®) standard.

This clinical terminology facilitates the interoperability of EHR, and is the terminology 'standard of choice' for semantic interoperability of EHR, since it provides the core clinical terminology for the interoperable Electronic Health Record (iEHR). Currently SNOMED CT® contains more than 357,000 concepts with unique meanings and formal logic-based definitions organised into hierarchies. However, SNOMED CT® is not currently available in French, so Infoway is leading the translation effort to ensure the pan-Canadian iEHR is able to serve the Canadian population if necessary in both official languages.

What have been the outcomes of your e-health initiatives?

The work of Infoway with the P/Ts has been proceeding well, particularly over the last several years, according to a federal review done in 2006 and the Health Council of Canada, which reports annually on results. However, Canada's plans for telehealth and EHR development in particular are ambitious, so they are not yet complete.

Governments in Canada are working with Infoway on the both the telehealth and the electronic health record priorities. Infoway has invested with P/Ts in projects to expand and sustain telehealth initiatives in Canada, in rural and remote communities in particular, including some Aboriginal and official language minority communities. Telehealth strategic plans are also now in place in most jurisdictions, and the implementation goal of telehealth solutions by all jurisdictions is by 31st December, 2009.

An important goal Infoway is working on with the provinces and territories is to provide a fully interoperable EHR for 50% of Canadians by the end of 2010. While all P/Ts have accelerated the development and implementation of the eEHR in their jurisdictions by working on projects with Infoway, according to the Health Council's 2007 report, while seven of Canada's 13 P/T jurisdictions are 'on track to achieve the goal by either 2009 or 2010', several are not as advanced.

Additional e-health initiatives and contacts from Canada

Highlights of international research on e-health:

- i. **World Health Organization** – Canada, along with several other Commonwealth member countries, was among the 112 countries that participated in Building Foundations for e-health, the first-ever worldwide survey done on this topic. Canada has a 10-year involvement in e-health and was able to cite activities in all five of the key areas included in the WHO survey.
- ii. **Organization for Economic Cooperation and Development (OECD)** – Canada is participating, along with several European countries, in a study being conducted by the Health Committee of the Organization for OECD "Assessing incentives for implementation of ICTs in the health sector. The study objectives are the development of indicators for monitoring and bench marking ICT adoption; research of the drivers and incentives for ICT adoption within the health sector; and conduct of case studies to obtain new data and insights. Canada has agreed to participate as one of the project's case studies, which will examine two e-health ICT projects.

Key e-health contacts at the federal level include:

Two senior Health Canada officials, the Deputy Minister and the Assistant Deputy Minister, Health Products and Food Branch, serve as the federal government's Corporate Member and Member of the Board of Directors, respectively.

Health Canada

Nancy Milroy-Swainson, Director, Chronic and Continuing Care Division with Health Policy Branch, lead on eHealth policy and liaison with Infoway.

Email: nancy_milroy-swainson@hc-sc.gc.ca Tel: +1 (613) 954 0834

Canada Health Infoway

Richard Alvarez, President and Chief Executive Officer of Canada Health Infoway

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Cook Islands



Kindly describe a successful or challenge e-health initiative your country has taken.

A successful e-health initiative that has been implemented by the Cook Islands Ministry of Health (CIMO) is the rollout of MEDTECH32, an electronic patient healthcare management system.

MEDTECH32 enables the centralisation of patient medical records (clinical, dental etc) into a single database. With the deployment of ICT equipment to outer-island rural healthcare centers, the MOH is able to use MEDTECH32 to capture clinical details of outer island patients into this single database.

MEDTECH32 has also made it possible for laboratory tests that are sent abroad for analysis to be transmitted back electronically into the patient file.

What were the financial challenges and costs associated with implementation of this programme?

- ✦ *The initial financial challenge was to find source funds for the purchase of the MEDTECH32 software and monthly costs for support and maintenance of MEDTECH32.*
- ✦ *MEDTECH32 required the setup of local area network (LAN) for the CIMOH at the hospital. For this, system administrators had to be employed to oversee the building of the LAN and deploying MEDTECH32 within the LAN.*
- ✦ *ICT equipment (workstations, server, printers, etc.) had to be purchased and integrated into the network in order for MEDTECH32 to be loaded and electronic capture of patient details to begin.*
- ✦ *Training in use of MEDTECH32 had to be conducted, which meant that healthcare workers from the outer islands had to be flown in, or system administrators flown out to these outer islands on an all-expenses-paid trip by CIMOH for the MEDTECH32 training program.*
- ✦ *Costs associated with providing internet access for the outer islands health centres were required. This was because access to MEDTECH32 from the outer islands was only possible via internet connectivity using Windows Terminal Server.*
- ✦ *On the main island of Rarotonga, leased lines had to be rented from the only telecommunications provider in the Cook Islands in order for clinics at the secondary sites to be able to use MEDTECH32.*

What have been the main technological challenges to implementing e-health in your country?

The main technological challenge to implementing this e-health initiative is endeavoring to deploy MEDTECH32 effectively with the available telecommunications infrastructure that is currently in place.

For CIMOH's Wide Area Network on Rarotonga, the effectiveness of MEDTECH32 at its second site is confined to the speed at which the leased lines joining it to the main site operates. The main site on Rarotonga is up at the Rarotonga Hospital, which houses the CIMOH main servers, including that of MEDTECH32.

The outer island health centres are faced with a similar situation where their use of MEDTECH32, which is primarily through Windows Terminal Server, is determined by the internet speed available in the outer islands.

Have any ethical issues been raised during the design and implementation of e-health programmes?

With MEDTECH32 being readily used by all sectors of the CIMOH, policies and restrictions had to be setup to determine the type of patient information that healthcare workers in certain sectors of the CIMOH had access to.

MEDTECH32 has inbuilt functions that system administrators use to grant or deny access of modules available to healthcare workers.

Has the implementation of e-health programmes required any legal or regulatory changes?

With the internet as the primary tool for deploying MEDTECH32 throughout all major health centers in the Cook Islands, CIMOH has put into place strict security measures to protect its network from cyber threats. While these measures have proved effective to date, the sensitivity of medical records in electronic format requires that legislation be put in place to protect against illegal electronic activity.

At the present time, electronic activity within the Cook Islands is not protected legislatively against criminal activity associated with electronic data.

What have been the outcomes of your e-health initiatives?

- ✦ *The implementation of MEDTECH32 means that CIMOH is able to centralise the medical records of its entire population into a single database. This means that regardless of the migration of people within the Cook Islands, healthcare workers throughout the country will have up-to-date information on the patient.*
- ✦ *MEDTECH32 allows patient information that is critical to diagnosing patients (e.g. laboratory results) to be readily available and accessible to healthcare workers regardless of the hospitals or health centres they are operating from. The speed of accessibility is far better than prior to the implementation of MEDTECH32.*
- ✦ *In terms of statistics, MEDTECH32 gives a better picture of the state of health in the Cook Islands population. It has led to more accurate reporting and better analysis of health statistics.*



Cyprus



Describe a successful or challenging e-health initiative your country has taken.

The Ministry of Health has decided to proceed with the implementation of a Health Care Information Support (HCIS) System in all government hospitals, outpatient departments and rural health centres. To this end, in 2004 the Ministry and the Department of Information Technology Services (DITS) jointly issued a Request for Proposal (RFP) for a turnkey ready-made application software which would provide an Integrated Health Care Information System. The vendor-selection procedure was completed two years later, in 2006. The HCIS tender contractual process has already begun with the computerisation of two flagship hospitals: New Nicosia General Hospital and Famagusta General Hospital. The project is now at the end of phase one.

The ICHIS project will be implemented in three separate phases, according to the roadmap below, which provides the key milestones of each phase according to the Initial Project Plan.

A further invitation to tender for consulting services, equipment and software development for a national health monitoring system was launched in August 2005. The project will develop an expandable, flexible comprehensive data warehouse to produce the required range of health indicators. The Health Monitoring Project was completed by the end of September 2007.

E-Health in Cyprus is intended to cover a wide range of products, systems and services. Examples of such applications are hospital information systems, a national health monitoring system (including the establishment of a number of disease registers in health), computerisation of primary care services, computerisation of the forthcoming Health Insurance Scheme, introduction of a patient card, a high-quality website for the Ministry of Health, information networks, electronic health records, standardisation of medical terminology, classification and coding of diagnoses, medical procedures, and causes of death, introduction of telemedicine services, and personal wearable and portable communicable systems and health portals.

The Ministry of Health then intends to roll-out the HCIS to all hospitals and medical centres under the public sector by 2010. Private doctors and clinics, where appropriate, will be given access to the hospital patient record. The recently constructed high-tech New Nicosia General Hospital will be the central node of the health institutions of Cyprus.

What were the financial challenges and costs associated with implementation of this programme?

The implementation of the computerisation of this phase is expected to cost more than 20 million euros.

What have been the main technological challenges to implementing e health in your country?

The lack of interoperability between current systems and administrations presents a big barrier in the development of the planned unification of the EHR. A robust gateway architecture is still needed to exchange and process data in a meaningful manner based on standardised data models and elements, common protocols for exchanging data and metadata standards; a prerequisite for which is the use of a uniform syntax. The architecture should also incorporate identity management, authentication, trust, security, data protection, etc. Standard activities and processes must be associated with baseline metrics.

We believe that this can be achieved through the introduction of a pan-European Health Information System, where all the information will be gathered at the place where it is generated and will be transformed and disseminated in an appropriate format. With regards to content, there will likely be different standard templates for each discipline, and also a uniform classification system of symptoms and diagnoses.

Have any ethical issues been raised during the design and implementation of e-health programmes?

The main ethical issues raised have to do with concerns about security and privacy. Also, both patients and doctors are accustomed to more traditional ways of interaction and work, which makes them hesitant to use new technologies.

Has the implementation of e-health programmes required any legal or regulatory changes?

Yes, even though there is sufficient awareness of the need to develop an effective legal framework that should be in line with the EC directives (aiming to support e-Government and e-Health), the introduction of appropriate legislation is moving slowly. The lack of a solid legal framework towards ICT is a main barrier to e-Government and e-Health developments. As a result, timely implementation of scheduled services is difficult to achieve.

Legislation related to the Processing of Personal Data (Protection of Individuals) Law of 2001 has entered into law in November 2001 and is compliant with EU directives. In 2004, Cyprus adopted two primary laws – the Law on Electronic Communications and the modification of the 2002 Law on Radio-communications – to transpose the new EU regulatory framework. It has also introduced four pieces of secondary legislation in the field of radio-communications. Cyprus, however, has not yet introduced the necessary secondary legislation for the Law on Electronic Communications. The Legal Framework for Electronic Signatures and for Relevant Matters Law and the e-commerce legislation have been also introduced. The e-Commerce legislation addresses the Certain Aspects of Information Society, and specifically Electronic Commerce and for Relevant Matters Law of 2004 and the Distance Conclusion of Contracts Law of 2000.

We believe, with recent developments in Europe in mind, that because health-related data needs to be accessible from the place where a patient is being treated, and because European citizens are becoming increasingly mobile, legal and ethical issues have to be dealt with more systematically. Without clear guidelines and adequate legislation, health professionals will be reluctant to adopt e-health practices. The formulation of the necessary legal framework must be carried out at the European community level.

What have been the outcomes of your e-health initiatives?

We do not have outcomes for our major project, but we have very positive results from various pilot projects.

The Ministry of Health has initiated the deployment of promising pilot projects in collaboration with the University of Cyprus. In particular, two projects are worth of mentioning.

- ✦ *First, the successful 2003 ministerial e-health finalist project DITIS has been adopted by the government to support the community care program. DITIS is a project which has been in development since 1999. It has been successfully deployed by PASYKAF for the home care of cancer patients. It enables the effective management and coordination of healthcare teams for the continuous assessment, diagnosis and treatment of patients at home or wherever else they may be. Also, through DITIS, healthcare providers have access to electronic patient information from anywhere and anytime via their computer desktop at work or a variety of mobile devices when on-the-go. We expect DITIS to provide multiple benefits, such as improvement of the care and quality of life of chronic (and other) patients, savings on scarce resources for the healthcare system, and more efficient provision of care. The Ministry of Health will initially deploy the system into two medical centres at Aglantzia and Kyperounta.*
- ✦ *The second project addresses the provision of e-emergency services. In the context of two successful European projects, the Ambulance HC1001 and Emergency-112 HC4027 projects (in which the Department of Accident and Emergency of the Nicosia General Hospital participated with the University of Cyprus), a portable medical device for emergency telemedicine was developed. The system enables the transmission of critical bio signals like the electrocardiogram, blood pressure, heart rate, temperature, and still images of the patient, from the emergency site to the hospital. The system enables the physicians to direct pre-hospital care in a more efficient way, improving patients outcome and reducing mortality. The system was designed in order to operate over several wireless communication links (such as satellite, GSM, GPRS, and UMTS). The Ambulance & Emergency network infrastructure for the island of Cyprus included: the connection of the Department of Accident and Emergency of the Nicosia General Hospital with an ambulance and a distant rural hospital at Kato Pyrgos. The system will be expanded to cover more medical centres.*

Additional e-health efforts in which the Ministry is involved include: the transmission of X-ray images in emergency orthopaedics cases and histopathology images during surgery between the Pafos and Nicosia General hospitals.



Grenada



Grenada e-Health in the Commonwealth: Building Healthcare Systems in the Digital Age

The Government of Grenada has recently developed a National Strategic Plan for the Health Sector, which sets out policies for the development and reform over the next five years under the theme 'Health for the Economic Growth and Human Development'.

Among some key issues and priorities of the Ministry of Health is health system development.

Grenada is divided into seven parishes, of which six have a health centre as the main primary care facility. There is also an additional 30 medical stations distributed throughout the country. The services offered by the Community Health Service are:

- ✦ *Community Nursing Service*
- ✦ *District Medical Service*
- ✦ *Community Mental Health*
- ✦ *Dental Health*
- ✦ *Pharmacy*
- ✦ *Health and Family Life*
- ✦ *Environmental*
- ✦ *Others*

The Hospital services consist of the following facilities:

- ✦ *General Hospital*
- ✦ *Princess Alice Hospital*
- ✦ *Princess Royal Hospital*
- ✦ *Mt. Gay Psychiatric Hospital*
- ✦ *Richmond Home for the Elderly*

There is inadequate information technology and connectivity at the disposal of the healthcare providers at the hospitals, health centres and medical stations. This limits the transfer of information and data from the reporting sites to the Health Information Unit based at the Ministry of Health.

This practice has numerous disadvantages such as:

- ✦ *lack of timely information and reports*
- ✦ *inaccurate data collection*
- ✦ *loss of valuable data due to inadequate storage, security and decentralisation of information*
- ✦ *limited access to information by policy-makers, healthcare providers and researchers*
- ✦ *inability to provide adequate follow up treatment and care.*

The Ministry has embarked on a programme to computerise the Health Information System. With assistance from the Pan American Health Organisation, the Ministry is currently conducting a health information system analysis to determine the deficiencies and gaps of the system, and also develop a strategic plan for the development of a comprehensive Health Information System that will include centralisation of information through networking systems.



India



Describe a successful or challenging e-health initiative your country has taken.

India in its growth has determined to use IT not only as a tool but also as an important pillar to achieve MDGs. To translate this in to action, an E-Health Vision has been prepared which comprises of following important actions:

- ✦ **One national health data network:** To develop a reliable, secure, nationwide health data network that will form the backbone of a national health information infrastructure. This will allow health information sharing amongst consumers, providers, payers, regulatory bodies, and if need arises, health professionals. The data network will have to include mechanisms for dealing with multiple data formats, languages, input devices, levels of reliability and 'IT-readiness'. The information obtained from this network will greatly increase the effectiveness and transparency of activities like monitoring and planning. The network can also be used for health education, training and awareness. A network of this kind can be built now, using a 'federated' data infrastructure that can integrate data from sources across the country.
- ✦ **Electronic data storage:** The electronic storage and regular update of data at all aspects of the health system. Eventually we would expect this to include electronic health records for all Indians that will provide every patient, care provider and care payer with the information necessary for optimal care, while reducing errors, lowering costs and administrative overheads. In the short term, electronic storage of data is a necessary step to introducing management methods that can reduce operational inefficiencies in the health system.
- ✦ **Standards:** The development of data and communication standards to enable secure, private, inter-operable, nationwide health information sharing. This will form the basis of the use of IT to share medico-legal records, follow up referrals, ensure an efficient supply chain of drugs, keep nationwide inventories, have a seamless exchange of information between hospitals and diagnostic laboratories, and so on. The standards should specify what data are stored, how the data are stored, and the mechanisms for sharing them. Development and maintenance of these standards will require the participation of public-sector organisations and private enterprises. This includes healthcare providers (both public and private), insurance providers, IT companies, central and state government. Significant steps in this direction have been taken recently by the Ministry of Communication and Information Technology, which has proposed a set of standards and guidelines to assist transactions between healthcare entities. These need to be extended to cover areas like electronic health records, drug databases and interactions, laboratory formats and technical specifications.

The various sub systems which has been started by the country are:

- ✦ Integrated Disease Surveillance System
- ✦ A data warehouse on monitoring and evaluation of outcomes
- ✦ Health (RCH) Planning and Monitoring System
- ✦ State Level M&E Systems
- ✦ Few pilots on telemedicine projects that help connect health centres in rural areas with urban referral hospitals.

There are steps being taken to merge these systems and complete the E-Health Vision.

What were the financial challenges and costs associated with the implementation of this programme?

India is a large country and any initiative needs to address a population of more than a billion people, a significant percentage of which resides in rural areas. While the pilot projects were deployed at a very low cost, the overall investment to create a National Health Data Network (NHNDN), as well as electronic data storage is significant. The Government will work through innovative Public Private Partnerships (PPP), where private enterprises will make the necessary investments, and the government will support with regulations and incentives to facilitate early adoption.

What have been the main technological challenges to implementing e-health in your country?

There are many barriers to the adoption or increased use of IT in healthcare, which include

- ✦ *Infrastructure- low power supply, poor telecommunications and connectivity*
- ✦ *Poor IT awareness and preparedness*
- ✦ *Merger of existing systems which are based on different IT technology*
- ✦ *Cost effective IT solutions*
- ✦ *Lack of standardised solutions*
- ✦ *More than 70 per cent of India is rural where the intensity of these challenges is even higher.*

Have any ethical issues been raised during the design and implementation of e-health programmes?

There is the usual concern around privacy and security of data when stored outside the hospital/healthcare centre. Mostly driven by the fear of misuse of data were it to fall into the hands of competitors. These are the issues need to be taken up more seriously.

Has the implementation of e-health programmes required any legal or regulatory changes?

The healthcare sector in India is in the concurrent sector, meaning that there are parts that are driven by the Central Government, and some by the State Government. In addition there is the private sector which accounts for almost 80 per cent of healthcare spending. While the government sector facilities are regulated by the government, there is hardly any regulation that governs private sector healthcare. Only in the last few years have a few progressive states started regulating private healthcare. In a way, this is good because regulations required to facilitate early adoption of e-health (signing up onto the NHDN, or following standards) can be created at this early stage. Thus a policy document is required to be placed for implementation across the country.

What have been the outcomes of your e-health initiatives?

It will be very early to provide outcomes of the e health vision as the implementation has just started, for example the IDSP has completed its first phase, Health Monitoring and Evaluation System have been conceptually designed etc. The major outcome to date that we have achieved are:

- ✦ *Separate allocation of funds for E health initiatives*
- ✦ *States has started taking steps for their system merger both horizontally and vertically*
- ✦ *Overall, the health sector environment has started using and understanding the importance of IT to achieve MDGs.*



Jamaica



North East Regional Health Authority

Describe a successful or challenging e-health initiative your county has taken.

No initiative reported on.

What were the financial challenges and costs associated with the implementation of this programme?

No initiative reported on.

What have been the main technological challenges to implementing e-health in your country?

Implementation is still in very embryonic stages. Major challenges may include:

- ✦ *'Technophobia' among policy makers in lead agencies*
- ✦ *Unavailability of broadband internet access in more rural areas*
- ✦ *Establishing electronic and computer equipment in relatively unsecured locations, both rural and urban with increasing security costs*

Have any ethical issues been raised during the design an implementation of e-health programmes?

Not applicable.

Has the implementation of e-health programmes required any legal or regulatory changes?

For e-health to be implemented, there are policy and medico-legal issues to be addressed, in particular for the following:

- ✦ *Telemedicine*

Acceptance of a digital imagery for reading the film or videotaped radiological procedure and acceptance of CME credits via online self-paced training.

- ✦ *Electronic Medical Records*

Unique identifiers; government policy regarding Tax Registration Numbers (TRNs) or National Registration number; data security and access issues.

South East Regional Health Authority

Describe a successful or challenging e-health initiative taken

The South East Regional Health Authority has developed a 'Food Handlers System', which is a database of all persons and organisations viz hotels, restaurants, bars, nightclubs etc.

The system facilitates better management of the employees involved in providing this service to the public.

What are the financial challenges and costs associated with implementation of this programme?

Challenges included funding for development and deployment of the system.

Development involved the analysis, design and programming of the system. Ensuring stability and user friendliness, while providing the necessary system controls.

Funding was required for the necessary software and for the support staff and for training.

The project was funded by the National Health Fund.

What have been the main technological challenges to implementing e-health in your country?

The recurring cost of the technology, even though available. A massive training exercise was carried out in the use of the system. Also the necessary hardware was purchased and deployed for the most efficient use.

Have any ethical issues been raised during design and implementation of e-health programmes?

There were some concerns about the storage and use of peoples signatures.

Has the implementation of e-health programmes required any legal or regulatory changes?

Training and certification procedures for handlers were modified, however the actual documentation for procedures has not yet been amended to reflect the changes.

What have been the outcomes of e-health initiatives?

The system has been in operation for the past three years, and has proven to be invaluable, other regional health authorities have adopted similar ones and another Caribbean country, Belize has also evaluated it.

Benefits derived include:

- ✦ *Improved customer satisfaction*
- ✦ *Improved data capture and analysis*
- ✦ *Reduction in fraudulent use of the card, and in other illegal operations*
- ✦ *Income generation.*

Southern Regional Health Authority

Describe successful or challenging e-health initiatives taken by your country?

The Southern Regional Health Authority implemented an e-health system by establishing a network infrastructure.

The first phase of the system has been initiated and is working quite well. The system in place provides access to five hospitals and three health departments.

The following benefits have been derived from this initiative:

- ✦ *All staff who have access to a computer can browse the internet*
- ✦ *Each staff member in the region can be assigned an email address including clinical staff (that is nurses, doctors, physicians, etc)*
- ✦ *Developing a culture where managers and other staff use the information technology system for major communications through the regional health authority's email system*
- ✦ *Extending access to the region's intranet for example for notices and general information*
- ✦ *Use of roaming devices to assist with customer service.*

In summary, implementing this initiative has now provided a platform which can accommodate the use of information systems within the Southern Regional Health, Authority. It is envisaged that other benefits will be derived which will further enhance the services of the region.

What were the financial challenges and costs associated with implementation of this programme?

The Southern Regional Health Authority project was funded by the National Health Fund (NHF). The National Health Fund is funded by the government and private sources.

What have been the technological challenges to implementing e-health in your country?

We are not yet fully oriented towards networked global thinking in our health System and are therefore not technologically driven. We need to develop and sustain a system that supports improved health care locally, regionally and worldwide by using information and communication technology. We need to perceive technology as an added tool to facilitate improved efficiency in the delivery of health care and not as a 'monster' waiting to expose us.

Have any ethical issues been raised?

Not applicable.

Has the implementation of e-health programmes required any legal or regulatory changes?

Yes, the confidentiality of data issue. Our laws will need modification in order to change the present system for storing medical records from hard copy format to soft copy format.

Also the present system for the issue of receipts to patients which are written by hand is to be changed to printed receipts, amendments or new regulations would be required.

What have been the outcomes of e-health initiatives?

The e-health initiative taken by the Southern Regional Health Authority to establish a network infrastructure has been successful and represents progress so far as it provides a foundation of a robust and upgradeable system.

The region is now able to deliver services at the point-of-care.

Regional Health Authority Task Force**Describe a successful or challenging e-health initiative your country has taken.**

- ✦ *Developed a web-based Electronic Health Record System (EHRS) for application throughout the Health Sector Software: UNIMEDICS*
- ✦ *Developed all specifications for building a multi-services IP backbone infrastructure for deploying a comprehensive Telehealth Network throughout Jamaica*
- ✦ *Research and development (R & D) project 'The National Telemedicine Project.'*

What were the financial challenges and costs associated with the implementation of this programme?

Major challenges with funding for:

- ✦ *R & D project*
- ✦ *Venture capital with project outcomes*
- ✦ *Partnerships with commercialisation of project*
- ✦ *Funding for further development.*

What have been the main technological challenges to implementing e-health in your country?

Broad-based infrastructure:

- ✦ *Needs further deregulation to enable affordable costs to enable ubiquitous use of patients*
- ✦ *Technological challenges e.g. training (funding) in new applications targeted to stakeholders*
- ✦ *Policy issues which influence norms and standards and the tardiness of the bureaucracy.*

Have any ethical issues been raised during the design and implementation of e-health in your country?

These ethical issues are well known and are built into the design of the software.

Those issues which are not software dependent will be dependent on the amount of resources available to stakeholders training and technological applications and solutions.

Has the implementation of e-health programmes required any legal or regulatory challenges?

There are no major legal or regulatory changes at this time.

What have been the outcomes of your e-health initiatives?

Presently we are the deployment of EHR in the management of chronic disease for the National Health Fund which will be deployed throughout the National Health Service System.



Malawi



Describe a successful or challenging e-health initiative your country has taken.

The ministry embarked on the installation of a broadband wireless network connection to link its satellite offices, which are located at a furthest distance of six kilometres from the headquarters. In total there were four sites that had Local Area Networks (LANs) installed eventually connecting to the broadband wireless network. This project was undertaken to improve communication via email and internet for quick management decision-making.

What were the financial challenges and costs associated with the implementation of this programme?

The installation and commissioning financial cost was approximately US\$55,700.

What have been the technological challenges to implementing e-health in your country?

The main technological challenges have been lack of adequate skills to sustain the infrastructure and telecommunication infrastructure, which is prone to frequent breakdowns.

Have any ethical issues been raised during the design and implementation of e-health programmes?

No ethical issues were raised.

Has the implementation of e-health programmes required and legal or regulatory changes?

No legal or regulatory issues were required to implement.

What have been the outcomes of your e-health initiatives?

As a newly launched initiative, it is anticipated that there will be remarkable improvement in the exchange of information between the various offices, which will in turn speed up decision making by management.



Malta



Describe a successful or challenging e-health initiative your country has taken.

Malta's e-health initiatives are being developed within the framework of the Government's development plan of a high speed network infrastructure, together with the launch of web-based applications such as the e-health portal and with major investment into a new Integrated Healthcare Information System.

What were the financial challenges and costs associated with implementation of this programme?

The main challenges for implementation have been the huge burden invoked by our limited resources and funds.

What have been the main technological challenges to implementing e-health in your country?

The main technological challenges have been the lack of availability of local expertise on the development of standardised software when compared with international companies offering a range of already established healthcare information systems. The geographical location of our island has also proved to be a limiting factor.

Have any ethical issues been raised during the design and implementation of e-health programmes?

Issues of sensitive changes to legal status of a citizen, when it comes to maintenance of databases of citizens and legal guardians are being resolved electronically.

Has the implementation of e-health programmes required any legal or regulatory changes?

All information systems implemented within government have to abide by the government of Malta's ICT policies, directives, standards and to the enacted Acts of Parliament, namely the Electronic Commerce Act and the Data Protection Act, to criminal code provisions which make computer misuse a criminal offence and also to Government's National ICT Strategy. Currently a national e-health Vision and Strategy is being drafted for eventual public consultation.

What have been the outcomes of your e-health initiatives?

The Integrated Healthcare Information System within the newly developed Mater Dei hospital is initially seeing the first six applications amongst which are a Laboratory Information System, a Radiology Information System and a Picture Archiving and Communication System.

Whereas the e-health portal currently serves as the main communication interface between the citizen, the health professional and the health service, for applications such as the online application for a European Health Insurance Card amongst others.



Mozambique



Describe a successful or challenging e-health initiative your country has taken.

The Ministry of Health Portal has been functioning since 2004 and is considered a 'routine' e-health system. Included on the portal are guidance and policy documents, routinely updated health statistics (some of which are updated weekly), updates on key events, trainings and workshops, programmatic descriptions, etc.

What were the financial challenges and costs associated with the implementation of this programme?

The Ministry of Health Portal approximate costs:

✦ Cost of feasibility study	US\$10,000
✦ Cost of realisation	US\$12,000
✦ Yearly Maintenance	US\$5,000

What have been the main technological challenges to implementing e-health in your country?

- ✦ Open source software
- ✦ Dynamic
- ✦ Local skills to manage all the technological implications (private and public)
- ✦ Specific capacity building for the MoH staff

Have any ethical issues been raised during the design and implementation of e-health programmes?

- ✦ Creation of a structure, protocols and the accessibility for the control of the publicised information (one web editor, many web redactors, one web manager)

Has the implementation of e-health programmes requires any legal or regulatory changes?

- ✦ The portal has been indicated officially and legally as the only web instrument of the MoH and has been included in all the official documentation and addresses. It is now part of the e-government instruments of Mozambique.

What have been the outcomes of your e-health initiatives?

The list below includes the major institutionalised e-health systems and outcomes.

System Name	Status	Outcome
Ministry of Health Portal: www.misau.gov.mz	Routine use (four years)	World accessibility to health information in real time
Modulo Basico (MB): Health Information System, main database at the national, provincial and district levels	Routine use (three years) and in expansion	The routine Health Information System
Use of PDA and AAP for data gathering and transmission in five pilot sites	Pilot (one year)	Not evaluated yet
Ministry of Health network and National Health Network: providing internet and e-mail at the Ministry and four provinces	Routine use (four years) and in expansion	Improvement of communication and access to information

Continued...

Country Surveys

<i>System Name</i>	<i>Status</i>	<i>Outcome</i>
<i>Epidemiological Surveillance System (BES), main database at the national and provincial levels</i>	<i>Routine use (20 years), in process integration in MB</i>	<i>The routine Epidemiological Surveillance System (based on aggregated data) has been made automatic. Integration of different sub-systems and historical consultations</i>
<i>Mortality</i>	<i>Pilot in the central Hospital</i>	<i>Creation of the first mortality database with an electronic patient record introducing ICD-10 codification and roles. Possibility to analyse high quality and specificity mortality data</i>
<i>Sistafe: government financial and accountability system</i>	<i>Routine</i>	<i>The accountability process has been made automatic. Integration, transparency and efficiency in the financial procedures</i>
<i>Sip: Human Resources System</i>	<i>Routine (eight years)</i>	<i>Human resources process has been made automatic</i>
<i>Electronic TB Register</i>	<i>Pilot</i>	<i>The routine TB Programme Information System (based on aggregated data) has been made automatic</i>
<i>Sigme: Sistema Integrado De Gestao De Medicamentos (Medicament System)</i>	<i>Routine (one year)</i>	<i>Automatization of the management of drugs. Integration, transparency and efficiency in the financial and logistics procedures</i>
<i>Sim Organiser: logistics and maintenance system</i>	<i>Routine (eight years)</i>	<i>Automatization of the goods an material logistics and maintenance</i>
<i>Facility Inventory Database</i>	<i>Pilot</i>	<i>Dynamic process for the inventory of health facilities</i>
<i>Various pilot and local systems in collaboration with NGOs and university: AIDS, laboratory, medical record, openMRS etc.</i>		

NOTE: For the Mozambican Ministry of Health e-health is intended as the use of information and communication technologies, including the internet, to improve or enable health and healthcare. More specifically in the e-health definition we include any part of the health information system adopting Informatics Technology, health information networks, electronic health records and medical records, electronic monitoring systems and health portals.



New Zealand



Kindly describe a successful or challenging e-health initiative your country has undertaken.

The Health Information Strategy for New Zealand (HIS-NZ) 2005 focuses on a system view rather than a structural view of the health sector. The strategy is not intended to be all-encompassing, but instead focuses on the gaps between health organisations, aiming to remove information and technology barriers to collaborative healthcare delivery within and across service settings. HIS-NZ provides the key elements for a federated electronic health information model to support and improve on current levels of health outcomes, at both individual and population levels. The strategy proposes 12 Action Zones:

- ✦ AZ 1 National Network Strategy
- ✦ AZ 2 National Health Identifier Promotion
- ✦ AZ 3 Health Provider Index Implementation
- ✦ AZ 4 e-Pharmacy
- ✦ AZ 5 e-Labs
- ✦ AZ 6 Hospital Discharge Summaries
- ✦ AZ 7 Chronic Care and Disease Management
- ✦ AZ 8 Electronic Referrals
- ✦ AZ 9 National Outpatient Collection
- ✦ AZ 10 Primary Care Information
- ✦ AZ 11 National System Access
- ✦ AZ 12 Anchoring Framework.

While the shape of the future is yet to be fully determined, early work has confirmed the technical viability of such a model, its fit within the health management framework and culture of New Zealand, and the types of benefits that can be delivered. HIS-NZ is governed by the Health Information Strategy Action Committee (HISAC), an independent Ministerial Advisory Committee with members drawn from across New Zealand's health sector. The Committee does not report to the Ministry of Health, but rather is responsible directly to the Minister.

What were the financial challenges and costs associated with implementation of this programme?

The Central Government provides around NZD\$1 million per annum to support HISAC and the independent advisory committee (and its office) in their role providing governance of, oversight of, and leadership for the implementation of HIS-NZ 2005. This amount includes a specific appropriation of NZD\$300,000 for the development of health information standards.

There is no central funding to implement the strategy. Rather, it relies on those organisations in the sector that do have funding to allocate it in ways that achieve the aims of HIS-NZ. In that regard, one of the main roles of the independent committee is to encourage investment and resource deployment in ways that achieve specific Action Zones.

What have been the main technological challenges to implementing e-health in your country?

There are few specific technological challenges to e-health in New Zealand. However, the HISAC Committee has identified general areas that will need to be resolved. These include:

- ✦ the need for improved information integration between primary and secondary healthcare providers
- ✦ the need for software applications in the marketplace to meet the requirements of non-government organisations and community healthcare providers
- ✦ the limitations of existing telecommunication networks in New Zealand.

Have any ethical issues been raised during the design and implementation of e-health programmes?

During the planning stages of every new e-health initiative, research into the potential use of the medical information and a privacy impact assessment are carried out.

HIS-NZ calls for the increased sharing of health information to improve health outcomes. The parameters around what information needs to be shared in different circumstances and the secondary use of medical information are being thoroughly analysed and debated.

Below are three examples of ethical issues raised by increased sharing of health information:

- ✦ *the extent of a patient's health record required by an emergency department when a patient is admitted unconscious, that is, whether they need to receive the patient's full medical history or just what is current and relevant*
- ✦ *the secondary use of health information outside the scope of improving health outcomes; for example, by other government departments and for insurance purposes*
- ✦ *medico-legal questions around the division of responsibility between healthcare professionals; for example, if GPs are informed that patients have not had medications dispensed, what, if any, are their medico-legal and ethical responsibilities to act?*

Has the implementation of e-health programmes required any legal or regulatory changes?

Yes. Examples of legal and regulatory changes include:

- ✦ *The Medicines Regulations (1984) and the Misuse of Drugs Regulations (1977), which govern the form of a prescription for medicines and controlled substances respectively, state that indelible text and hand written practitioner signatures are required for a legitimate prescription in New Zealand. In the more recently passed Electronic Transactions Act (2002), the electronic prescribing of medicines was specifically excluded, to allow the regulatory environment and nationally-coordinated systems time to develop a consistent and robust approach. The Medicines Regulations are currently being reviewed to permit both handwritten and secure electronic prescribing to co-exist and to improve the consistency between the two forms of prescription.*
- ✦ *The Health Information Privacy Code (1994) amendment came into effect in November 2007. The amendment was required to broaden the range of agencies approved to assign national health index numbers (NHI numbers, or patient identifiers). This amendment was needed to align regulations with the structure and needs of the current health and disability environment. Additional agencies now able to assign NHI numbers include Primary Health Organisations, Independent Practitioner Associations, the Department of Corrections Health Services and the New Zealand Defence Force Health Services. As well, "any health agency that has a contract with the Accident Compensation Corporation or a District Health Board or the Ministry of Health to provide health or disability services". Registered medical practitioners, registered midwives and registered physiotherapists that were listed separately have been replaced by the generic classification of 'Health Practitioners'.*

What have been the outcomes of your e-health initiatives?

As yet, it is considered too early to have achieved major outcomes under our current e-health strategy, HIS-NZ. However, some outcomes already achieved are listed below.

- ✦ *Our national patient identifier – the National Health Identifier (NHI), which was established in 1976, has been fully electronic since 1992.*
- ✦ *We have a national register of patient immunisations.*
- ✦ *Our Health Information Network has been developed to allow online management reporting from national collections to district health boards.*
- ✦ *We have almost 1,000 practitioner organisations connected to a secure Health Network for the exchange of secure health information.*
- ✦ *Our Health Information Standards Organisation has recently developed a range of important national standards to support increased information-sharing amongst healthcare providers, including referrals and discharge summaries, laboratory and pathology orders and results, and integrated mental health information.*
- ✦ *Almost all laboratory companies in New Zealand electronically-transmit test results back to the general practitioners who ordered the tests.*
- ✦ *Our government has approved investment in a number of the HIS-NZ Action Zones, including networking, identity management upgrades and extension, national systems access and interoperability standards. (Work is advanced around investment in information capability to support primary care and chronic conditions.)*
- ✦ *There is evidence of greater collaboration across the health sector to achieve the HIS-NZ Action Zones.*



Papua New Guinea



The National Department of Health (NDOH) in Papua New Guinea regrets to say that e-Health facilities are not yet installed in the National Health Information System, the hospital records or within Public Health.

The sixth survey question 'What have been the outcomes of your e-health initiatives?' has not been addressed simply because our Telecommunication system in regard to the "e" processes are not yet developed to the level of industrialised or developed nations.

The email systems (with their many servers) are still not fully servicing the entire country due to major geographic and logistic challenges.



Seychelles



Kindly describe a successful or challenging e-health initiative your country has taken.

The National ICT policy, spearheaded by the Seychelles Ministry of National Development, was launched in 2007.

In 2000, the Ministry of Health began its long drive to interconnect all its health facilities through a local and a wide-area-network of close to 300 computers.

This was the first step towards the introduction of an electronic patient management system. If all goes well, the electronic patient management system will be operational during 2008.

What were the financial challenges and costs associated with implementation of this programme?

Although the Health Information System has been identified for e-health implementation adequate financial commitment is a major challenge.

What have been the main technological challenges to implementing e-health in your country?

- ✦ *Current challenge is incompatibility of specialised medical equipment, which is not dicom compatible.*
- ✦ *Facilities for teleconference and telemedicine are still not in place*
- ✦ *Internet speed is still relatively slow in the Seychelles. It is believed that it will speed up soon. E-health will be the main driver for health and health services improvement. Steps are being taken in that direction. Soon the Ministry of Health and Social Development will have its own dedicated VSAT for e- health.*

This will eliminate the poor bandwidth problems of the internet.

- ✦ *The other challenge is security of information while transmitting it to another location.*

Have any ethical issues been raised during the design and implementation of e-health programmes

There were no ethical issues raised.

Has the implementation of e-health programmes required any legal or regulatory changes?

In the Seychelles the Data protection act is in place.

What have been the outcomes of your e-health initiatives?

- ✦ *Data collection for disease surveillance and response is undertaken with far less effort, saving money and time in the process. Online epidemiological journals and bulletins are regularly produced.*
- ✦ *Ministry of Health and Social Development has developed a website on which citizen oriented information is provided on various medical topics.*
- ✦ *At least two pilot attempts at radio-conferencing have been made thus far, to link the main island, Mahe, with Centres of Excellence in Europe.*
- ✦ *The Ministry of Health and Social Development has long realized the potential for telemedicine as, if connected via tele-medicine, the 115 islands of the Seychelles will respond better to the health needs of their inhabitants.*



Kindly describe a successful or challenging e-health initiative your country has taken.

Sierra Leone is in the process of implementing the Sierra Leone Integrated Data System (SLIDS) Program. This is a collaborative effort of multiple organizations and agencies that will develop and implement a nationwide integrated health data management system to sustainably provide diverse users with the information and information use skills required for improved health decisions. It will realize this goal by achieving the following objectives:

1. *Develop National Integrated Data Repository for Sierra Leone containing routine data and indicators from the health services, disease surveillance data, population census data and health facility surveys, as well as key data and indicators from other identified data sources. This is to achieve effective data flows between national and district levels through exploration and appropriate use of the internet and communication technologies. This includes:*
 - ✦ *The customisation and further development of a District Health Information System (DHIS) software, integration with OpenHealth and other applications to the requirements and needs of MoHS.*
 - ✦ *The customisation and integration of OpenMRS (Open Medical Record System) and other computerised data sources; establishing integrated data repository; customisation and integration of OpenHealth for web based reports, pivot tables and Geographical Information Systems (map-based web reporting). Customise and set up OpenMRS for ART patient tracking at hospital and integrate with DHIS, both for internal hospital statistical system and for district and higher level system*
 - ✦ *Establish hospital reporting system focusing on patient flow indicators (average length of stay, bed occupancy, death rate etc.) and the top 10-20 diseases.*
 - ✦ *Customising and applying Open-Health, and other tools, to prepare standard web reports for the various levels including key indicators and data, to be used for dissemination and feedback at facility, district and national levels. Set up pivot tables for data analysis and chart presentations at all levels where health managers can easily select their "view" regarding level, i.e. whether one wants to investigate data by facility, by program, by project or by type of facility, by district or by chiefdom. Both online (national data repository) and offline (local) reporting will be established.*
 - ✦ *Set up a GIS system for display of data and indicators from the DHIS on thematic maps for all levels.*
2. *Exploring appropriate communication, power and computing technologies in the context of Sierra Leone where both power and communication infrastructure is poor. Tasks are:*
 - ✦ *Explore and test low-power computers and solar power equipment for district and facility level installations*
 - ✦ *Explore and test wireless communication for local area networking and transmission of data*
 - ✦ *Establish and test internet in districts*
 - ✦ *Explore the cellular network for the purpose of data transfer to the national data repository from districts and hospitals, and from facilities to district.*

What were the financial challenges and cost associated with implementation of this programme?

Financial challenges include:

- ✦ *Provision of sustainable ICT infrastructure*
- ✦ *Provision of Technical Support to MoHS to effectively use the system*
- ✦ *Provision of the right staffing to support the system*
- ✦ *Training and capacity building for continuity*

The associated financial cost to implement the initiative will be US\$1.2 million over a period of five years.



Singapore



Describe a successful or challenging e-health initiative your country has taken.

In 1999, acute care hospitals, specialty centres, and primary care clinics in Singapore were restructured into two vertically integrated clusters: the National Healthcare Group (NHG) and Singapore Health Services (SingHealth). Both are owned by the government and partially funded through subventions. By 2003, both clusters had implemented extensive clinical IT systems. For example, Singhealth has a cluster-wide single-instance Electronic Medical Record (EMR) system that allows a clinician in any Singhealth institution to access the EMRs of their patients that have been generated from any other Singhealth institution. Although NHG institutions have different EMR systems, they were linked through a Cluster Patient Record Sharing system. However, both clusters were unable to share information across clusters.

To enable interoperability between clusters, the Ministry of Health implemented an EMR Exchange (EMRX) system in 2004 for clinicians in the public sector to secure health information. Since its inception, EMRX has been continually enhanced with the sharing of an expanding list of clinical information: hospital inpatient discharge summaries, laboratory and radiology reports, medications, immunization records, school health records, operating theatre reports, endoscopy reports and cardiac and emergency department reports.

In addition to the exchange of electronic documents, a national database was developed in 2006 as a repository of critical patient information such as medical alerts and drug allergies.

This system allows direct reporting by doctors of their patients' drug allergies and key alerts (e.g. patient on anti-coagulation therapy, etc.) and can be integrated to the e-prescription systems of the respective hospitals/clusters for automated alerts. Adverse drug reaction reports are also generated and routed to the pharmacovigilance unit of our national drug regulatory agency.

To achieve our vision of "One Patient, One Medical Record" EMRX was extended beyond the public sector to one of the community hospitals in November 2007. Doctors at the community hospital can now access the electronic medical records of patients referred by public hospitals, polyclinics or specialist centres, and vice versa. This would help to facilitate national efforts to promote integrated care.

Further steps to share medical information across the private and public healthcare sectors are envisioned under Singapore's 10-year Intelligent Nation 2015 master plan.

What were the financial challenges and costs associated with implementation of this programme?

A key challenge is the significant investment in infrastructure and ongoing operating costs by healthcare providers. While the Ministry funded the startup costs of the project, the healthcare providers needed to fund the operating costs and enhancement costs to their systems. As this is a shared system, the appropriate proportion of costs that should be borne by different stakeholders needed to be worked out. Sectors such as community hospitals and nursing homes also face human resource constraints in driving e-health implementation.

What have been the main technological challenges to implementing e-health in your country?

The central infrastructure needed to be architected in a robust and scalable manner such that healthcare providers coming onboard the EMRX do not need to incur high upfront costs and existing providers do not need much additional rework.

The timeliness of information is another key consideration. Clinical information shared with other institutions could become outdated if stored in a repository and not refreshed each time an update is made. This could have significant impact on clinical decision-making. Therefore, EMRX adopted a pull-on-demand – rather than pre-delivery – model. Clinical information from EMRs will only be pulled at the request of clinicians and discarded after use. Storage is prohibited.

Have any ethical issues been raised during the design and implementation of e-health programmes?

Questions relating to data privacy and confidentiality were raised during the design and implementation of these e-health initiatives. Safeguards that were put in place included excluding sensitive information such as HIV and STD status from being shared through the EMRX. Only healthcare professionals who are directly involved in the care and treatment of the patient are allowed to access the patients' electronic medical records using their personal passwords. Stringent audit mechanisms were also put in place to detect unauthorized use.

Has the implementation of e-health programmes required any legal or regulatory changes?

The Computer Misuse Act (CMA) was enacted in 1993 to tackle computer misuse in general. This was necessary because of the widespread use of info communications technology in Singapore. The Act criminalises unauthorised access to computers, unauthorised modification of computer programmes and data, unauthorised interception of a computer service and computer-assisted crime. E-health initiatives benefit, in part, from the protection that the CMA confers.

What have been the outcomes of your e-health initiatives?

The sharing of electronic medical records through EMRX assists clinicians with up-to-date information on patients' medical records. This facilitates faster and better clinical decision making and treatment, especially in emergency settings where the doctors are unfamiliar with the patient's medical history. EMRX has also facilitated more integrated care.

E-health initiatives and e-health contacts:

e-health initiatives

- ✦ Electronic Medical Records Exchange (EMRX)
- ✦ Student Health Assessment Programme (SHAPE) and Integrated Dental Electronic Assessment for Students (IDEAS)
- ✦ MediClaim system
- ✦ Integrated Clinic Management System (CMS)
- ✦ Healthcare Messaging System (HMS)

e-health contacts

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Sri Lanka



Describe a successful or challenging e-health initiative your country has taken.

- ✦ *The Ministry of Healthcare and Nutrition has its own Website. This website is updated daily by assigned permanent trained staff (www.health.gov.lk)*
- ✦ *The Web Based Human Resource Management System monitors HR placements and is used to correct distribution*
- ✦ *The database on health infrastructure is used to monitor bed occupancy and utilisation of institutions*
- ✦ *Training calendar*
- ✦ *Management of financial systems (payment of salaries and internal auditing)*
- ✦ *MCH information system*
- ✦ *Epidemiologically information system*
- ✦ *E-recruitment*
- ✦ *E-transfers: This web is used to advertise the vacant positions and to implement transfers*
- ✦ *Internal examinations and results are published on this websites*
- ✦ *Information discrimination of special activities*
- ✦ *Information discrimination of key programmes. e.g: HIV/AIDS, TB, Malaria MCH etc*
- ✦ *Internal e-communication*
- ✦ *E-filing system in two project areas sponsored by JAICA.*

What were the financial challenges and costs associated with implementation of this programme?

- ✦ *Difficult to get adequate funds to improve the systems*
- ✦ *No funds to train to health staff.*

What have been the main technological challenges to implementing e-health in your country?

- ✦ *E-literacy of the staff*
- ✦ *Non-availability of computers in the peripheral institution*
- ✦ *Peripheral not linked with as.*

Have any ethical issues been raised during the design and implementation of e-health programmes?

- ✦ *Confidentiality of information.*

Has the implementation of e-health programmes required any legal or regulatory changes?

- ✦ *No policy*
- ✦ *ICTA is in the process of drafting an e-communication policy for the government of Sri Lanka.*

What have been the outcomes of your e-health initiatives?

- ✦ *Now the Ministry has improved its communication internally as well as with donor communities*
- ✦ *Rapid access to Health information*
- ✦ *The system is more transferable*
- ✦ *It has reduced clerical worked.*



St. Kitts and Nevis



Describe a successful or challenging e-health initiative your country has taken.

To date, St. Kitts and Nevis has not embarked on any e-health initiatives. The Government is contemplating an initiative as one component of a wider e-Government initiative.

Work is in the preliminary stages.

What were the financial challenges and costs associated with implementation of this programme?

Not applicable at this time.

What have been the main technological challenges to implementing e-health in your country?

Not applicable at this time.

Have any ethical issues been raised during the design and implementation of e-health programmes?

Not applicable at this time.

Has the implementation of e-health programmes required any legal or regulatory changes?

Not applicable at this time.

What have been the outcomes of your e-health initiatives?

Not applicable at this time.



The Gambia



E-Learning is a form of learning health through technology. It gives pupils and students the opportunity to know about health issues and at the same time give them the opportunity to use computer.

In recognition of the enormous benefits that can be derived from the venture, the Gambia submitted a two year proposal for the e-Learning project. The project was jointly developed by the Departments of State for Education (DOSE), Health and the WHO Gambia Office. DOSE serves as the Secretariat for the project and hosts all meetings whilst Health serves as chair. The team consists of two representatives from the Health department, three from the Education Department and one member from the WHO Office.

An initial assessment of all the potential schools was completed to school readiness for the project and to establish the needs for the schools. This was completed from 18th -23rd June 2007.

Twenty four schools were selected based on the selection criteria. Below is a brief description of the schools that were selected. The project as mentioned earlier is scheduled to run for two years. However, the first year has passed and virtually nothing is implemented. This is due to the fact that funds have not been released. Seven topics have been selected for the project which includes

- 1. Avoiding Tuberculosis: focusing on increasing knowledge on Tuberculosis prevention and control*
- 2. Fighting for our lives: focusing on Tobacco control*
- 3. Safety on our way: focusing on road traffic accidents*
- 4. Stay fit: focusing on physical activity*
- 5. All the way to the blood bank: focusing on HIV/AIDs*
- 6. Malaria*
- 7. Water for life*



Trinidad and Tobago



Describe a successful or challenging e-health initiative your country has taken.

Currently the ministry is embarking on the implementation of a National Health Information System sector-wide.

What were the financial challenges and costs associated with implementation of this programme?

Funded by the GORTT and approved by Cabinet.

What have been the main technological challenges to implementing e-health in your country?

Because Trinidad and Tobago Health Sector has no legacy systems in operation, the possibility of implementing an e-health National Information System is optimum. The major challenge is the change from management issues in the transformation of the present National Health administration into an information-based administration.

Have any ethical issues been raised during the design and implementation of e-health programmes?

Ownership of the patient health records and remote access to it with the corresponding security scheme.

Has the implementation of e-health programmes required any legal or regulatory changes?

The Health Sector Reform Programme e-health initiative must have the corresponding legal framework to operate from a centralized database IT structure, and allowing patient's data to be accessed by different stake holders.

What have been the outcomes of your e-health initiatives?

In the development process.



Uganda



Kindly describe a successful or challenging e-health initiative your country has taken.

Uganda is implementing many e-health initiatives. One of them is; "Enhanced Access to Health Services and Information through ICTs in Uganda" This was a three year (2000-2003) pilot project executed the Faculty of Medicine of Makerere University.

Project components

- ✦ **Internal** videoconferencing between Mulago and Butabika national referral hospitals and audio-conferencing linkage between Mulago, Mbarara Medical School, Mbale regional referral hospital, Rakai and Lyantonde district health offices
- ✦ **External** email and internet service in Mulago and Butabika facilitating store and forward teleconsultation with external centres

Project objectives

- ✦ Training of medical staff in basic computer skills and production of content and ICT-based teaching materials
- ✦ Provision of distance learning (lectures and seminars) and teleconsultation
- ✦ Collaboration with internal and external institutions/entities in e-health

Project Outputs

- ✦ The participants were introduced to the concept of integrating ICTs into healthcare
- ✦ Awareness raised on the scope and usefulness of ICTs in terms of teleconsultation, tele-education and getting information from the net
- ✦ Acquisition of skills in computer use and production of ICT-enhanced health material
- ✦ Shared lectures and discussions between project sites

Project challenges

- ✦ Resistance, as this was viewed as additional work without remuneration and technophobia especially among the elderly and those in remote areas
- ✦ Poor acoustics in the sites with background noise interfering with the sessions
- ✦ Limited network coverage, especially in remote areas and the old land lines creating a lot of background noise
- ✦ There was no direct advice or supervision by the project funders with understanding of the situation on the ground
- ✦ Low capacity for telecommunications, computer, network management and timely scheduling of sessions.

What were the financial challenges and costs associated with the implementation of this programme?

- ✦ Project budget hampered identification of affordable and durable equipment due to high equipment costs. However local communication companies were cooperative with health related projects and gave discount for communication costs.
- ✦ Process of disbursing funds from donors, equipment sourcing and procurement is long and yet the project duration is from the time of signing the funds. The entire process of deliberations, search and identification, adjustments, payment and installation stretched from December 2000 to November 2003, requiring a time extension.
- ✦ There was a one hundred and ten planned budget line for acoustics in the rooms and sustainability. Patients could not pay for teleconsultations since they did not fully understand the concept of telemedicine.

What have been the main technological challenges to implementing e-health in your country?

- ✘ *Low computer literacy among health workers impacting on the limited use*
- ✘ *Non-existence/limited number of computers especially in rural health units.*
- ✘ *Limited technical expertise to plan, manage and maintain Information and Communication Technologies (ICTs) for health and rapidly changing technology hampering sustainability.*
- ✘ *High costs of hardware, software and connectivity.*
- ✘ *Lack of agreed standards, guidelines and specifications for communication and IT hardware and software to ensure equipment compatibility and interoperability.*
- ✘ *Numerous stand alone donor funded projects with limited collaboration leading to fragmentation, duplication and wastage of resources*
- ✘ *Rapidly changing technology for health workers with limited exposure to ICT*
- ✘ *Non existence of policy and relevant laws to support e-health.*

Have any ethical issues been raised during the design and implementation of e-health programmes?

- ✘ *External doctors from another environment advising as third party professionals without consent of the patients.*
- ✘ *Security during teleconsultation and transfer of patient information.*
- ✘ *Involvement of non-medical providers especially technical ICT staff and information managers.*
- ✘ *Health workers more aware of the need for addressing ethical issues.*

Has the implementation of e-health programmes required any legal or regulatory changes?

- ✘ *Legislation is recommended because existing laws do not cover issues of e-health. E-Commerce laws do not cover e-health.*
- ✘ *The National e-health Steering Committee is currently looking at areas of e-health that require legal and regulatory changes.*

What have been the outcomes of your e-health initiatives?

- ✘ *Raised awareness among policy-makers leading to the appointment of the National e-health Steering Committee an advisory and supervisory body.*
- ✘ *Formulation of a national e-health policy, strategy and implementation which are in the final stage and lead by the national e-health Committee.*
- ✘ *A policy committing the Ministry of Health to using ICTs to improve healthcare delivery while addressing issues of sustainability.*
- ✘ *Increased computer and internet use among health workers. There is also increased demand for computer training and more computers for health workers, especially among the young ones.*
- ✘ *Development of ICTbased CME material and training on content creation and multimedia development.*
- ✘ *Health worker interaction through the Health Node that was established.*
- ✘ *Human resource capacity built in the use of ICTs for health.*

E-Health Initiatives

1. Mulago Hospital – Fuerth Hospital (University of Erlangen-Germany)
Internet robot dynamic Telepathology Project
2. Information and Data Management for Rural Health Units (UCMB)
3. Uganda Health Information Network (UHIN)
4. National e-health Policy, Strategy and Implementation Plan (Draft)



United Kingdom



Describe a successful or challenging e-health initiative your country has taken.

The National Programme for IT in England is one of the largest and most advanced e-health programmes in the world. The aim of the programme is to help the National Health Service (NHS) to deliver better and safer care to patients via new IT systems and services that link primary care general practitioners (GPs) and community services to hospitals. Key components of the programme are:

- ✦ *a new national network which connects all NHS organisations and provides a secure and reliable infrastructure for world-class networking services and sufficient broadband capacity to meet current and future needs*
- ✦ *a Care Records Service which is aiming to provide secure electronic access to up-to-date clinical records for every individual*
- ✦ *an Electronic Prescription Service which allows prescribers in primary care settings to generate and transmit electronic prescriptions which can then be received electronically by dispensers*
- ✦ *the Choose and Book electronic referrals system through which patients are able to book their hospital appointments electronically at a place, date and time which is convenient to them*
- ✦ *Picture Archiving and Communications Systems which allow X-rays and scanned images to be stored electronically and viewed simultaneously at multiple locations.*

The goal to provide a fully integrated IT infrastructure and systems for all NHS organisations in England by 2010 continues to present significant challenges. Some major elements of the programme are in place, but there is more to be done in certain areas.

What were the financial challenges and costs associated with implementation of this programme?

The National Programme for IT is a multi-billion programme of investment, spread over 10 years, in new systems and ways of working aimed at changing the way healthcare is delivered in the NHS.

The cost of the contracts over 10 years is £6.3 billion. However, the National Audit Office Value For Money Report in June 2006 estimated the overall cost to be £12.4 billion made up of a number of elements:

- ✦ *the cost of contracts with suppliers to deliver the new systems, including some new items added to the original scope*
- ✦ *the central costs of implementing the new systems*
- ✦ *the local costs of implementing the new systems within the NHS*

The key financial challenges are:

- ✦ *ensuring value for money in the use of public funds*
- ✦ *transfer of financial risk from the public to the private sector (suppliers are only paid on delivery of the systems/ services)*
- ✦ *maintaining year on year financial balance and ensuring that the overall cost envelope for the programme is achieved*
- ✦ *managing 'Scope creep', i.e. unbudgeted extension of the programme and its deliverables*

What have been the main technological challenges to implementing e-health in your country?

While the infrastructure is provided by the National Programme for IT, the realisation of benefits depends on the upgrading and integration of local systems with the infrastructure and deployments being managed by local NHS Trusts.

The main challenges faced by the programme continue to be:

- ✦ *the introduction of modern information technology and the business changes necessary to exploit it fully without impacting the safe delivery of care. The programme has set ambitious and challenging targets to deliver systems to provide defined benefits and believes it is better that there should be some delay to implementation of a system to get it right for patients and clinicians, rather than to deploy it rapidly and get it wrong. Also, significant focus is being placed on ensuring that local NHS organisations play a full part in implementing the programme to make best use of the programme's systems and to improve services, e.g. in deciding on the timing of deployment of new systems and ensuring that users are fully trained.*
- ✦ *the capacity and capability of suppliers of information technology systems to develop and implement the products and services required under the programme. To address this, the agency responsible for delivery of the National Programme (NHS Connecting for Health) has recently secured a range of framework contracts to supplement existing supply capacity and capability of IT products and services to the NHS. The frameworks will enable the streamlined procurement of IT systems and services from suppliers who have demonstrated experience in the health sector and can be used to support both National Programme for IT related work and wider IT related projects.*

Have any ethical issues been raised during the design and implementation of e-health programmes?

The main ethical issue concerning the National Programme for IT has related to the model of consent used in the design and implementation of the NHS Care Records Service (NHS CRS) Summary Care Record (SCR). The SCR is intended to be available throughout England to those who need to access it to deliver care and who have the necessary security permissions. Whilst the implementation of the NHS CRS and the SCR has received widespread support, there is a clear difference of views on the model of consent adopted for the Summary Care Record. This concerns the question of whether the creation of a SCR should require the patient's explicit consent, or whether, following a public information campaign, consent should be assumed and a SCR created unless the patient has made a specific decision that this should not happen. These two positions are often referred to as the opt-in and opt-out models and each has strong ethical arguments in its favour. The programme has consulted widely as part of a Ministerial led Taskforce and, based on this consultation, has adopted the opt-out model and is now, in the words of the Taskforce "making haste cautiously", proceeding with a public information programme in designated areas of England. This early adopter programme for Summary Care Records is being independently evaluated. The findings, which are due to be reported by Summer 2008, will determine the roll-out timetable for the rest of England.

The government takes the protection of patient confidentiality very seriously. Following the consultation with representatives of patient groups and clinicians, a care record guarantee has been made public, which sets out the terms and conditions that the government accepts as commitments to patients for the safeguarding of personal information. In terms of security, all systems and services delivered through the National Programme incorporate stringent security controls and safeguards to prevent unrestricted or uncontrolled access to personal information. The five separate levels of control are:

- ✦ *all users must prove evidence of their identity and residence to be registered for access to the national systems by means of a Smartcard*
- ✦ *access is only possible through possession of a Smartcard which, together with a passcode, confirms their identity and rights to access information*
- ✦ *role-based access ensures that staff are only able to access as much information as is needed for the purpose of their role within the healthcare team. For example, a receptionist will be able to see information about an appointment but will not have access to detailed clinical information*
- ✦ *the systems will not permit access to clinical information unless the user is registered within the system as a member of the team delivering care to the patient concerned, i.e. that the user has a "legitimate relationship" with the patient. General practitioners working as part of a team can establish a "workgroup" to confirm they have a "legitimate relationship"*

- ✦ *a record (audit trail) is kept of all activity within the system and an alert is made if an apparent unauthorised access is attempted.*

The work of the National Programme is also critical to improving patient safety and the quality of care provided by the NHS. In recognition of this, NHS Connecting for Health has appointed a Chief Clinical Officer responsible for ensuring that improving the quality and safety of patient care remains central to the work of the programme. Rigorous checks are also carried out to ensure that systems are fit for purpose before any new systems are deployed.

Has the implementation of e-health programmes required any legal or regulatory changes?

Only insofar as it has been necessary to put in place governance arrangements around the use of confidential patient information without consent, e.g. for non-clinical secondary purposes. Since 2001, this duty has been carried out by the Patient Information Advisory Group established under Section 61 of the Health and Social Care Act of 2000. The recently published Health & Social Care Bill sets out the government's plans to establish the National Information Governance Board as a statutory body and to transfer the functions of the Patient Information Advisory Group to it.

What have been the outcomes of your e-health initiatives?

The secure national network, the roll-out of new patient administration and clinical systems, and all of the other National Programme achievements are now supporting the NHS to provide faster, more convenient and more effective services. Examples include:

- ✦ **Choose and Book** is a national electronic referral service which gives patients a choice of place, date and time for their appointment in a hospital or clinic. Patients can choose their hospital or clinic and then book their appointment to see a specialist with a member of the practice team at the GP surgery, or at home by telephone or over the internet, at a time more convenient to them. By the end of 2007, over 6 million bookings had been made using the Choose and Book system, with a daily average of 20,000 bookings.
- ✦ the **Electronic Prescription Service** enables prescribers (i.e. GPs and practice nurses) to send prescriptions electronically to a pharmacy of the patient's choice. Over 1.5 million prescription messages are now transmitted each week between GP practices and pharmacies linked to the system (over 63 million messages transmitted since the service went live in February 2005). Sixty per cent of GP systems and pharmacy systems are now connected to the service.
- ✦ the **Picture Archiving and Communications Systems** enable images such as X-rays and scans to be stored electronically and viewed on screens. The systems are fully deployed in 127 acute hospitals in England, making X-rays on film (and missing X-rays) a thing of the past, and leading to much faster and improved diagnoses. Over 550 million digital images and 22 million studies have been stored since the systems went live in 2005
- ✦ **GP2GP** is a system which enables patients' electronic health records to be transferred directly and securely between GP practices, meaning that GPs will usually have full and detailed records available for them for a new patient's first consultation. Electronic transfers are more accurate and secure – and available in minutes rather than the current paper-based approach used by the majority of practices, which can take around six weeks to complete. Over 64,000 medical records have so far been transferred electronically using the GP2GP system
- ✦ **NHS Care Records Service** – over 153,000 patients' clinical records have been uploaded to form Summary Care Records which will be available to authorised healthcare professionals delivering patient care, principally in an urgent or unscheduled care environment. The Summary Care Record forms the national element of the NHS Care Records Service, which will hold an electronic record for every person in England (who does not object). This record will contain limited but important information such as a patient's known allergies, current medications and any adverse reactions to medicines.
- ✦ **New National Network (N3)** – over 21,000 secure broadband connections have been installed, including 11,000 in primary care locations



Vanuatu



Kindly describe a successful or challenging e-health initiative your country has taken.

The POLHN – Pacific Open Learning Health Network. This is a regional initiative initiated by the WHO, and its aim is to provide access to e-health facilities for health workers in Pacific Island countries.

What were the financial challenges and costs associated with implementation of this programme?

The initial establishment costs were met by the WHO. It is difficult for Vanuatu to continue to provide e-health in-country because of lack of capacity and resources. The WHO continues to support the operations of this initiative in-country. Long-term sustainability is questionable.

What have been the main technological challenges to implementing e-health in your country?

The main challenges have been: lack of capacity, lack of resources (e.g. funds), high tele-communication costs, the need to raise more awareness to encourage health workers to use e-health, and the slowness of the internet connection.

Have any ethical issues been raised during the design and implementation of e-health programmes?

Not that I am aware of.



Zambia



Describe a successful or challenging e-health initiative your country has taken.

The e-health initiative in the country is that of putting personal information on a very secure credit card appearing device and giving it to the patient to present to the clinician the next time they seek care. The Patient Information System involves making a touch screen computer tool for the clinician to use in viewing and recording patient data. This data is the patient's Electronic Medical Record (EMR), and a client database is kept at facilities visited.

SmartCare as it is known, is a joint project, funded mostly by the Government of the Republic of Zambia and the U.S. Centers for Disease Control and Prevention (CDC), to create an electronic medical record system for the people of Zambia. SmartCare's vision is that "each person in Zambia has a complete electronic health record that is used to assure them of a continuity of high quality confidential care, by providing timely information to caregivers at the point of service and to health policy makers through integration with the national Health Management Information System (HMIS).

"SmartCare is working through its cooperating partners to improve service delivery, patient care, and health data accuracy and reliability." The project has entered its sixth year of operations.

A critical milestone for the project, the Ministry of Health (MoH) designated SmartCare as the national Antiretroviral Therapy (ART) care system in April 2006. From this point forward, SmartCare has intensified its efforts to integrate parallel health information management systems and scale up operations nationwide.

What were the financial challenges and costs associated with implementation of this programme?

The sustainability of this project is based on its capacity to make paying the high cost of ARV's more sustainable than it would be without the card. A card currently costs about \$1.50, and will last many years or until lost or destroyed. One can discourage loss or destruction by a replacement fee. (Currently the replacement fee for the UTH ART ID card is about \$5.) The card costs are significantly larger than the touch screen computer, UPS, and printer costs.

A person on ARV's may use \$200/year of drugs alone, on a first line regimen, and as much as \$1,800/year on a second or third line regimen, and failing that, may have no further recourse. If only one out of 100 issued cards delays the development of line 1 resistance by only 1 year, the \$1,600 savings would easily make the issuance of cards a major money saving strategy.

And it would also be saving lives by delaying progression to full resistance.

Resources were placed in a JHPIEGO Cooperative Agreement that can support training, travel, and other related special costs for Phase I effort, including hiring people to minimize or eliminate any net burden on current clinical operations or to assist with early monitoring and evaluations.

If this effort appears to contribute significantly to Zambia's need, USG has budgeted additional monies that would support the implementation.

Implementation partners are deploying and are providing resources such as equipment and personnel.

What have been the main technological challenges to implementing e-health in your country?

The main technological challenges have been:

- ✦ *Relatively low technology requirements: SmartCare only requires intermittent electricity and no telecommunications infrastructure to function.*
- ✦ *The deployment of computer equipment in health facilities, training of DHMT management, District Health Information Officers, Hospital Information Officers and the health facility staff such as the nurses, with the latter personnel being made computer literate.*

- ✦ *Maintenance of computer equipment and the provision of computer virus software updates in a non WAN environment.*
- ✦ *Introducing a lock-down policy so that misuse of computer equipment is addressed, for example disabling media player.*

Have any ethical issues been raised during the design and implementation of e-health programmes?

Ethical issues have been raised, and among others have been the introduction of a pledge of confidentiality form, which must be filled in by all users of the application and signed upon reading its contents. This must be filled by developers as well. For example, pledging the following:

- ✦ *Accepting the responsibility to maintain and protect the confidentiality of all information and data collected and processed for the Health Facility.*
- ✦ *I understand my role in ensuring the right to privacy of persons and institutions cooperating with the health facility and the Ministry of Health as a whole.*
- ✦ *I understand that the Ministry of Health has and will enforce policies that protect patient rights to privacy regarding their personal and medical information.*
- ✦ *I understand that I must not reveal any confidential information to anyone except another staff member authorized to receive such information, and will not discuss patient information in public.*
- ✦ *I understand that there are legal and ethical obligations to protect the privacy of patients and their personal and medical information.*
- ✦ *I understand that failure to protect the confidentiality of patients, personnel and medical information will result in disciplinary action up to and including dismissal.*
- ✦ *I understand that any willful violation of the confidentiality policy may subject me to legal action beyond my association with the Ministry of Health.*
- ✦ *I have read and understand the above confidential policy and procedures and pledge to act in accordance with these policies and procedures.*

Has the implementation of e-health programmes required any legal or regulatory changes?

The Ministry has issued policy guidelines to cooperating partners and implementation partners regarding;

- ✦ *Ethics and confidentiality*
- ✦ *Resource leveraging*
- ✦ *Capacity building for sustainability*
- ✦ *Software version harmonization*
- ✦ *Data sharing*

What have been the outcomes of your e-health initiatives

The outcomes for this initiative have been:

- ✦ **Reduced Staff Workload:** *With less time spent on looking for old or misplaced paper files and trying to read bad handwriting, doctors and nurses have more time to focus on what is most important, the patient.*
- ✦ **Improved Confidentiality of Patient Medical Records:** *A 'CareCard' being carried by a patient is significantly more secure than them carrying around paper records. Other role-based security controls have been put in place within the SmartCare system to restrict access to individual patient data to those who truly require it.*
- ✦ **Reduction in Paperwork:** *SmartCare eliminates the need to maintain patient identifiers and HMIS tally sheets:*

- ✦ *As of 31 December 2007, about 15,000 patients are carrying 'CareCards' nationwide.*
- ✦ *As of December 2007, there are 45 sites treating 15,000 patients using the ANC/PMTCT, Delivery, and VCT SmartCare modules.*
- ✦ *As of December 2007, there are more than 84 sites serving more than 120,000 patients using the ART modules.*