eHealth Strategy South Africa

2012

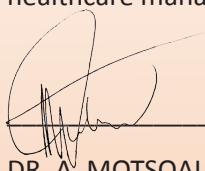*A long and healthy life for all South Africans*

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Foreword by the Minister

Effective monitoring of healthcare service delivery and overall performance of the health systems requires functional health information systems capable of producing real time information for decision making. Globally, Information and Communication Technology (ICT) has emerged as a critical enabling mechanism to achieve this. This eHealth Strategy for the public health sector in South Africa ushers in a new era of optimism about the capabilities of our health information systems.

Historically, health information systems in South Africa have been characterised by fragmentation and lack of coordination, prevalence of manual systems and lack of automation, and where automation existed, there was a lack of interoperability between different systems. Considerable resources were also invested in these systems that, in the final analysis, did not generate the expected returns on investment.

In August 2009, the National Health Council (NHC), chaired by myself and comprising of the 9 Provincial MECs for Health, resolved that the acquisition of software solutions which were not interoperable should be halted until the eHealth Strategy for South Africa is finalised. The strategy should provide us with a clear roadmap that guides us from the current status to an integrated and well functioning national patient-based information system, based on agreed upon scientific standards for interoperability, which improves the efficiency of clinical care, produces the indicators required by management, and facilitates patient mobility. The architecture of this system should also enable an interface with other transversal systems used in health sector. Such a system is also a critical enabling factor for the implementation of National Health Insurance (NHI).

The eHealth Strategy for the public health sector provides the roadmap for achieving a well functioning national health information system with the patient located at the centre. The Ministry of Health and the NHC will closely monitor the implementation of this strategy, to ensure that previous errors do not revisit us and that the strategy indeed supports patient care and healthcare management.

DR. A. MOTSOALEDI, MP
MINISTER OF HEALTH
DATE: 9 July 2012

Minister of Health
Dr Aaron Motsoaledi

Deputy Minister of Health
Dr Gwen Ramokgopa

Director-General for Health
Ms MP Matsoso

Acknowledgement

This strategy aims to support the strategic objectives of the Department of Health in a way that is comprehensive, pragmatic and innovative. It defines eHealth as a broad domain which includes mHealth, telemedicine and all information communication technologies (ICTs) used to promote, support and strengthen healthcare.

Linking its vision and mission to the health sector's Negotiated Service Delivery Agreement 2010-2014, it aims to supports the medium-term priorities of the public health sector, pave the way for future public sector eHealth requirements, and lay the requisite foundations for the future integration and coordination all eHealth initiatives in the country (both public sector and private sector).

The strategy adopts a set of principles which include getting the basics right, taking an incremental approach, building on what already exists and looking for early wins.

The document includes a thorough situational analysis and takes a clear look at the challenges facing the country as it moves forward to fulfil the aims of the strategy.

Finally, ten strategic priorities for eHealth are identified and the key activities required for each of these priorities are outlined, with accompanying commencement and completion dates within the period 2012 – 2017. These ten priorities that must be acted on are:
1. Strategy and Leadership
2. Stakeholder Engagement
3. Standards and interoperability
4. Governance and Regulation
5. Investment, Affordability and Sustainability
6. Benefits realisation
7. Capacity and workforce
8. eHealth foundations
9. Applications and Tools to support healthcare delivery
10. Monitoring and Evaluation of the eHealth Strategy

This strategy is a product of a concerted effort by a team of officials from the National DoH and the Medical Research Council (MRC) who worked tirelessly to develop it, in constant consultation with the National Health Information Systems Committee of South Africa (NHIS/SA).

The Technical Advisory Committee (TAC) of the National Health Council (NHC) will provide the technical oversight required to ensure successful implementation of this strategy.

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MS MP MATSOSO
DIRECTOR-GENERAL: DEPARTMENT OF HEALTH
DATE: 01 June 2012

1. Introduction

1.1 What is eHealth?

The World Health Organisation defines eHealth as "the use of information and communication technologies (ICTs) for health to, for example, treat patients, pursue research, educate students, track diseases and monitor public health."[1]

This short definition covers a vast domain, including:

- Electronic Health Records (enabling sharing of patient data between points of care),
- Routine health management information (e.g. web-based surveillance systems, electronic disease registers, electronic district health information systems),
- Vital Registration (the use of computerised systems for registration of death or births),
- Consumer Health Informatics (access to information on health by healthy individuals or patients),
- Health Knowledge Management (e.g. best practice guidelines managed and accessed electronically),
- mHealth (e.g. use of mobile devices such as cell-phones to share information or to collect aggregate or patient data),
- Telemedicine (e.g. use of ICTs to provide care at a distance),
- Virtual Healthcare (e.g. teams of professionals working together via ICTs), and
- Health Research (e.g. use of high performance computing to handle large volumes of data).

This strategy adopts the above definition of eHealth and aims to comply with the resolution WHA58.28 on eHealth, adopted by the 58th World Health Assembly in 2005.[2]

1.2 The 10 Strategic Priorities

Ten strategic priorities that must be addressed in order to leverage eHealth to strengthen healthcare transformation in South Africa are:

1. Strategy and Leadership
2. Stakeholder Engagement
3. Standards and Interoperability
4. Governance and Regulation
5. Investment, Affordability and Sustainability
6. Benefits Realisation
7. Capacity and Workforce
8. eHealth Foundations
9. Applications and Tools to support Healthcare Delivery
10. Monitoring and Evaluation of the eHealth Strategy

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[1] http://www.who.int/topics/ehealth/en/
[2] http://www.who.int/healthacademy/media/en/eHealth_EB_Res-en.pdf

2.   Vision, Mission, Aim and Key Principles of this strategy

2.1   Vision

eHealth: enabling a long and healthy life for all South Africans.

2.2   Mission

To establish eHealth as an integral part of the transformation and improvement of healthcare services in South Africa, especially enabling delivery on the health sector's Negotiated Service Delivery Agreement 2010-2014.

2.3   Aim

The overall aim of this strategy is to provide a single, harmonised and comprehensive eHealth strategy that:

a) Supports the medium-term priorities of the public health sector.
b) Paves the way for future public sector eHealth requirements.
c) Lays the requisite foundations for the future integration and coordination of all eHealth initiatives in the country (both public sector and private sector)[3].

2.4   Key principles

In order to best overcome the challenges listed above, the programme of work that will lead from this strategy will have to be underpinned by certain key principles, i.e. fundamental assumptions that will guide decision-making by the National and Provincial Departments of Health.

These principles are:

- **Get the basics right** – infrastructure, connectivity, basic ICT literacy, human resources and affordability planning.
- Take an **incremental approach** – build on what exists already in both the public and private sectors and fill the gaps where necessary.
- Look for **early wins** in implementations and benefits to build the confidence of health professionals, patients and the public in eHealth.
- **Advocate the benefits** of care enabled by eHealth and ensure that these benefits are realised.
- Constantly **evaluate eHealth initiatives** and measure improvements in health outcomes in order to build an evidence base that demonstrates the net benefits over time of eHealth and guides planning and decision-making.
- Establish **national co-ordination** on all initiatives in order to improve the effectiveness of eHealth at all levels.
  - o   Enable integration between systems wherever appropriate.
  - o   Enforce common standards, norms and systems across the country.[4]
  - o   Establish common data standards and terminology across information systems.
- Encourage a collaborative approach by leveraging **partnerships**, e.g. private sector, NGOs, other government departments, other country governments, research organisations.

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[3] The National Health Act of 2003 empowers the Minister of Health to regulate both the public and private health care sectors.
[4] NSDA on Health for period 2010-2014 Sub-output 4.4.8 Strengthening Health Information Systems

- Protect information **security, confidentiality and patient privacy** at all times.
- Promote **information governance** consensus among all stakeholders in order to use information better.
- When required, procure cost-effective and re-usable information systems in order to get **value for money**.
- Consider available **open source** solutions for cost effectiveness.
- Build the capacity and the systems to obtain official health statistics from a **single official source**[5].
- Adhere to the **NHIS/SA principles** for information management.[6]
- Ensure that **intellectual property ownership** of public sector eHealth initiatives are vested in government.

In addition to the above principles, the strategy seeks to provide benefits within the six domains of healthcare quality put forward by the Institute of Medicine (IOM) and the additional imperative of improving access. These six domains are:

- **Safety:** Avoiding harm to patients from the care that is intended to help them.
- **Effectiveness:** Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and misuse, respectively).
- **Patient-centeredness:** Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.
- **Timeliness:** Reducing waiting times and potentially harmful delays for both those who receive and those who give care.
- **Efficiency:** Avoiding waste, including waste of equipment, supplies, ideas, and energy.
- **Equitability:** Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.

3.   Problem statement and challenges

The following quotation from the NSDA 2010-2014 sums up the problem statement for this eHealth strategy: *"Although large sums of money have been used to procure health ICT and HIS in South Africa in the past, the ICT and HIS within the Health System is not meeting the requirements to support the business processes of the health system thus rendering the healthcare system incapable of adequately producing data and information for management and for monitoring and evaluating the performance of the national health system. This results from the lack of technology regulations and a lack of policy frameworks for all aspects of infrastructure delivery."*[8]

The quotation highlights key challenges identified in relation to eHealth. The following are specific challenges identified with respect to eHealth, particularly in the public sector:

- No national eHealth strategy and corresponding Enterprise Architecture supporting the national health system.
- Limited capacity or capabilities within the public sector to implement a national eHealth strategy.

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[5] NSDA on Health for period 2010-2014 Sub-output 4.4.8 Strengthening Health Information Systems
[6] The strategy also takes into account the key principles adopted by NHIS/SA.
- Data to be collected at the point of its generation.
- Data collection is to enable service assessment as well as self-assessment.
- Service delivery personnel would have responsibility for the collection of data relevant to their specific duties.
- Where feasible, the basic analysis of the data would be carried out at the point of collection.
- Collection, aggregation and analysis of data would follow the organisational structure of health services, that is national data would comprise of the sum of the provinces, provincial data of the sum of its districts, district data of the sum of its sub-districts.
[7] Institute of Medicine (IOM).Crossing the Quality Chasm: A New Health System for the 21st Century. Washington, D.C: National Academy Press; 2001.
[8] NSDA on Health for period 2010-2014, page 9.

- Widely differing levels of eHealth maturity across and within provinces.
- A large number of disparate systems between which there is little or no interoperability and communication.
- Silos of information within levels of government, government departments and programmes within the national and provincial departments of health, resulting in duplication of effort and disparities in reporting.
- Inequity of eHealth services provided and expenditure[9] on eHealth across national and provincial departments of health. (This may be related to differing strategic importance placed on eHealth).
- Broadband connectivity is expensive and still out of reach of many.
- A low degree of cooperation, collaboration and sharing across all sectors.
- Several past initiatives have not reached fruition because of poor planning or lack of consistent sponsorship, management and/or funding.
- Need for strong information governance to ensure compliance with the necessary standards and procedures for, and appropriate use of, health information (both patient-based and aggregate).
- Different organisational structures for eHealth service provision exist in provinces, e.g. health ICT services may reside within a department of health but in an inappropriate section, or within another department.
- The absence of a national master patient index and lack of consensus on unique identification of patients.
- A lack of cooperation between various groups resulting from lack of a clear understanding that eHealth includes **all ICTs for health** such as mobile technologies, telemedicine and electronic patient records. This lack of cooperation prevents urgently needed progress in using eHealth as an enabler.

4.   Situational Analysis

4.1   Structural, Policy and Legislative Context

As early as 1997, the NDoH published the White Paper for the Transformation of the Health System in South Africa. The White Paper advocated the establishment of a comprehensive national health information system with two components:

- Management information and disease surveillance systems.
- Population health and demographic surveillance.

Health services in South Africa are delivered across three levels of government: national, provincial and local. In terms of the South African Constitution[10], both national and provincial governments have concurrent jurisdiction over health as a service delivery area, i.e. both make decisions and have a duty to deliver services. In practice, the role of the NDoH focuses on legislation, policy, norms and standards, and ensuring equity, while the role of the provincial departments of health is focused on the planning, budgeting and delivery of health services at the coal face. Local government is responsible for the delivery of municipal health services as stipulated in the National Health Act No. 61 of 2003.

The delivery of eHealth services (as defined above) in public sector facilities is the responsibility of the provincial departments of health. The responsibility for eHealth policy and strategy development resides with the NDoH. In terms of Section 74 of the National Health Act, the NDoH is responsible for the facilitation and coordination of health information. The Act stipulates that *"the national department must facilitate and coordinate the establishment, implementation and maintenance by provincial departments, district health councils, municipalities and the private health sector of health information systems at national, provincial and local levels in order to create a comprehensive national health information system"*.[11]

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[9] Survey on ICTs in Health conducted by the National eHealth Steering Committee, September 2009.
[10] Constitution of Republic of South Africa, No. 108 of 1996. Schedule 4, Part A.
[11] National Health Act No. 61 of 2003, Section 74[1].

The Act empowers the National Minister of Health to *"prescribe categories or kinds of data for submission and collection and the manner and format in which and by whom the data must be compiled or collated and must be submitted to the national department"*.[12]

The NDoH exercises its coordination and facilitation role through the National Health Information System of South Africa (NHIS/SA) committee.

The NHIS/SA committee was established in 1994 with the broad objectives of:

- Ensuring the availability of information for the management of health services.
- Measuring the health status of the South African population.
- Coordinating country-wide health information systems.

The membership of the NHIS/SA committee consists of senior managers in the NDoH responsible for health information, monitoring and evaluation, epidemiology, and research; senior managers responsible for similar functions in the provinces, and invited representatives from partners and other organisations. The NHIS/SA committee meets quarterly and reports to the Director-General of the NDoH.

4.2   The Requirement for a National eHealth Strategy

There are various international and national mandates for a national eHealth strategy.

At the fifty-eighth session of the World Health Assembly (WHA) in May 2005, Resolution WHA 58.28 on eHealth was adopted.[13] The resolution urges member states:

- To draw up long-term strategic plans for developing and implementing eHealth services that includes an appropriate legal framework and infrastructure and encourages public and private partnerships.
- To develop the infrastructure for ICTs for health as deemed appropriate to promote equitable, affordable, and universal access to their benefits, and to continue to work with information telecommunication agencies and other partners to strive to reduce costs to make eHealth successful.
- To strive for closer collaboration with the private and non-profit sectors in information and communication technologies, in order to further public services for health.
- To endeavour to reach communities, including vulnerable groups, with eHealth services appropriate to their needs.
- To mobilise multi-sector collaboration for determining evidence-based eHealth standards and norms.
- To evaluate eHealth activities, and to share the knowledge of cost effective models, thus ensuring quality, safety and ethical standards.
- To establish national centres and networks of excellence for eHealth best practice, policy coordination, and technical support for healthcare delivery, service improvement, information to citizens, capacity building, and surveillance.
- To consider establishing and implementing national public health information systems.
- To improve, by means of information, the capacity for the surveillance of, and rapid response to, disease and public health emergencies.

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[12] National Health Act No. 61 of 2003, Section 74[2].
[13] WHO World Health Assembly 2005 resolution on eHealth WHA 58.28. http://www.who.int/healthacademy/media/en/eHealth_EB_Res-en.pdf

As early as 2001, the Government of South Africa accentuated the need to develop functional information systems in all government departments. The South African Public Service Regulations 2001[14] stipulated the requirement for Departments to have in place mechanisms to appropriately manage and develop information management.

According to **E.1**, a head of a government department shall establish:

- An information plan for the department that supports:
  - o The planning process and objectives contemplated in regulation III B.
  - o Compliance with Part I of Chapter 5.
- An information infrastructure plan that supports the information plan:
  - o An operational plan that enables the implementation of the information infrastructure plan and information management.

According to **Chapter 5, Part 1 (A)**: Underlying Electronic Government Value (Principles):

- Departments shall manage information technology effectively and efficiently. The Batho Pele[15] principles of offering equal access to services, increasing productivity and lowering cost, shall inform the acquisition, management and use of information technology. Information technology shall be used as a tool to leverage service delivery by the public service and shall therefore not be acquired for its own sake.

While all government departments are therefore required to have a strategy to support information management and the use of information technology, a strong national eHealth strategy that coordinates the implementation of eHealth projects and programmes, and guides efforts to strengthen information management, is essential. It is also essential that the strategies for information management and ICTs in the provincial departments of health are aligned with this national eHealth strategy.[16]

In addition, the Electronic Communications and Transactions Act (2002)[17] leads all ICT initiatives in the country by making provisions for the development of a five year national e-strategy that aims to enable and facilitate electronic transactions in the public interest.

Over the last few years there have been several efforts towards drawing up a comprehensive national eHealth strategy for the country.[18, 19, 20] These efforts have contributed to this strategy.

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[14] Public Service Regulation 2001 : **Regulation E of Part III of** Chapter 1
[15] Batho Pele – Putting People First. http://www.info.gov.za/aboutgovt/publicadmin/bathopele.htm
[16] The World Health Organisation distinguishes between three key information related concepts namely: (i) an *Information System*, which is defined as "a system that provides information support to the decision-making process at each level of an organization" ; (ii) a *Health Information System*, which is a system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services" ; and (iii) a *Health Management Information System*, which is "an information system especially designed to assist in the management and planning of health programmes, as opposed to delivery of care" . It is widely accepted that health management information systems can build on existing data and health information system standards and infrastructure. Reference: *"Developing Health Management Information Systems: A Practical Guide for developing Countries, World Health Organization, Regional Office for the Western Pacific"* (2004).
[17] Electronic Communications and Transactions Act [No. 25 of 2002]. http://www.info.gov.za/view/DownloadFileAction?id=68060
[18] PNC on ISAD: White Paper on e-Health, November 2007.
[19] Draft eHealth Strategy developed by National eHealth Steering Committee, 2009.
[20] National Strategic Framework for eHR.ZA Implementation in South Africa, 2007.

4.3   eHealth funding and expenditure

Funding for eHealth implementation is located within the provincial and municipal budgets, although there is no specific allocation from NDoH for eHealth. Financial investment in eHealth has varied from province to province and the result has been a marked inequity of eHealth expenditure across provinces.

An audit of deployment of ICTs revealed disparities in the treatment of ICT as a strategic enabler for healthcare service delivery in the provinces.[21] Gauteng, Limpopo and KwaZulu-Natal had the largest annual budgets for 2009: R188.3m, R178.6m and R105m respectively, in nominal terms. On the other end of the spectrum were North West, Northern Cape and Free State with R15m, R20.4m and R32m respectively. These disparities were also demonstrated in the spending on human resources (HR) for ICT. The percentage of budget committed to personnel ranged from 10% to 25%.

It should also be noted that the total expenditure reported in this audit did not include expenditure by local authorities, especially the larger metros, which may be substantial. Overall it may be observed that, since 1994, there has been considerable but uncoordinated investment in eHealth, with limited tangible benefits and return on investment.

4.4   eHealth Maturity

The landscape analysis of HIS in developing countries funded by the Bill and Melinda Gates Foundation[22] provides a categorisation of five stages of eHealth maturity as countries move toward systems of greater scope, scale, and sophistication in HIS. These stages are based on data flow and collection, data utilisation and integration, resources and capacity, scope, and scale.

Stage 1 - paper-based systems for collecting district health indicators,
Stage 2 - optimisation of paper systems through simplifying indicators and reducing duplication,
Stage 3 - migration of traditional district health information systems to electronic storage and reporting,
Stage 4 - introduction of operational ICT systems as a source of data for HIS,
Stage 5 - a fully comprehensive and integrated national HIS.

This report places South Africa at Stage 3. However, eHealth maturity is linked to resource availability and as a result some provinces are at Stage 2, others at Stage 4, while some may have various regions or districts at Stages 1, 2 and 3.

In order for South Africa to move to Stages 4 and 5 it needs to:
- Implement patient-based information systems at all facilities where healthcare is delivered.
- Link all these systems to a national electronic health record system.
- Derive all indicator data from patient data captured electronically at the point of care.
- Establish a unique identifier for each South African.
- Ensure effective registration of births and death.
- Support access from all facilities to all records in other facilities.

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[21] Survey on ICTs in Health conducted by the National eHealth Steering Committee, September 2009.
[22] Vital Wave Consulting (Funded by Bill and Melinda Gates Foundation): Health Information Systems in Developing Countries: A Landscape Analysis. May 2009.

4.5   National Healthcare Management Information System (NHC/MIS)

The National Healthcare Management Information System (NHC/MIS) was drawn up by NDoH in 1994. It describes the functionality that addresses the day to day management of health services which must be implemented at all levels of healthcare. The core modules of the NHC/MIS are:

- Patient registration.
- A basic summary care record.
- Patient billing.
- Appointment scheduling.
- Clinical pharmacy.
- A Patient Master Index (PMI).

In 1996 the implementation of the NHC/MIS was decentralised and the procurement and implementation of the NHC/MIS modules became the responsibility of the provincial departments of health and their accounting officers, the Heads of Department. As a result, several disparate systems have been implemented in the provinces with varying degrees of success. The current scenario is illustrated in **Table 1**. Besides being implemented on different platforms and databases, these systems vary widely in their architecture, impact on workflows, usability and support structures. The systems are unable to communicate with each other (there is no interoperability) and they do not communicate with a National PMI.[23]

 The HIS landscape analysis referred to in 4.4 notes the following:

"Despite all the support and active implementations of various HIS, not all provinces have all components of the NHC/MIS. EMR systems are somewhat functional in just one-third of provincial hospitals. There are five different proprietary systems in use and there is little integration between them. Computer and Internet access is not commonly found in state hospitals or at the provincial level. Western Cape Province appears to be progressive, implementing a central hospital information system with a unique patient ID, a pharmacy system, digital radiology, and community healthcare clinics and local city clinics that access the same provincial level patient ID. The private sector also faces the same problem of fragmented systems."[24]

Province	Patient Management/Hospital Information Systems in use.
Eastern Cape	Delta 9
Free State	Meditech; PADS
Gauteng	Medicom; Soarian MedSuite; PharmAssist; PAAB
KwaZulu-Natal	Medicom; Meditech; PALS; Pro-Clin; ReMed
Limpopo	Medicom
Mpumalanga	PAAB
North West	PAAB
Northern Cape	Nootroclin
Western Cape	Clinicom; Delta 9; PHCIS; JAC Pharmacy

Table 1. Patient Management/Hospital Information Systems currently deployed in public sector facilities in South Africa

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[23] http://www.pnc.gov.za/index.php/e-health/articles-a-events/44-health-care-management-information-system-nhcmis
[24] Ibid.

In the last few years the NDoH has made a strategic decision to implement a national Electronic Health Record system. The goal of this is to allow patient tracking wherever patients present themselves and it aims to address the above issues of lack of interoperability, fragmentation and the absence of a National PMI.

4.6   Telemedicine

"Although Telemedicine has long been recognized as an effective means to overcome the challenges in rural health settings in South Africa, there has also been a lot of skepticism about the practicalities of the technology."[25] This may partly be blamed on the limited success of the national Telemedicine Programme initiated by NDoH and NHIS/SA in 1999 and 2000.

After installation of the hardware, the various services were handed over to the provinces to maintain and expand. *"While aspects of the programme showed promise there was limited uptake of the project and it was not successful. There is little to suggest that circumstances have changed, as a major problem factor in the implementation of the project was the shortage of healthcare workers in the State sector and their reluctance to take on any additional work. A second factor was the top down approach and the lack of capacity and failure to manage change."*[26]

Despite the slow start, telemedicine still holds much promise as a tool to support the delivery of healthcare, especially in rural settings in South Africa. Telemedicine attracts considerable interest and innovation among academics, researchers, private enterprise and health professionals. Since 1999 there have been some noteworthy achievements within the public health domain. The NDoH recognises the potential of telemedicine as an *"enabling tool that could bridge the gap between rural healthcare and specialist facilities."*[27]

4.7   mHealth

Mobile technology has provided an opportunity to revolutionise healthcare, especially in countries like South Africa that have the challenges of providing care in deep rural settings but also have a thriving telecommunications market.

"The South African telecommunications market is the largest in Africa totalling US$25 billion in 2006, but South Africa continues to descend down the international scales of competitiveness and e-readiness. Broadband penetration is low and bandwidth is expensive. Mobile phones have given access to millions who were previously marginalised from personal communications and mobile phone penetration is estimated at 75% with approximately 90% of the country covered by mobile telephony. It is likely that mHealth will play an ever increasing role in medical informatics, telemedicine, surveillance and healthcare education in Africa."[28]

[25] Media statement Issued by the South African Medical Research Council (MRC) September 2011. http://www.mrc.ac.za/pressreleases/2011/12press2011.htm [26] Mars, M and Seebregts, C. Country Case Study for eHealth: South Africa. Rockefeller Foundation. 2008. http://www.ehealth-connection.org/content/country-case-studies

[26] Mars, M and Seebregts, C. Country Case Study for eHealth: South Africa. Rockefeller Foundation. 2008. http://www.ehealth-connection.org/content/country-case-studies

[27] Media statement Issued by the South African Medical Research Council (MRC) September 2011. http://www.mrc.ac.za/pressreleases/2011/12press2011.htm

[28] Mars, M and Seebregts, C. Country Case Study for eHealth: South Africa. Rockefeller Foundation. 2008. http://www.ehealth-connection.org/content/country-case-studies

There have been several successful mHealth initiatives in South Africa, including the surveillance system developed by NDoH for the 2010 Soccer World Cup. Current projects include the system developed to collect data for HIV counselling and testing.

4.8   eHealth Standards

For successful implementation of an eHealth strategy, technical standards are required to ensure national and international compatibility, interoperability, open architecture, modularity and capacity for upgrade. Nationally adopted standards should enable the procurement and implementation of affordable, cost effective and accessible technology that complies with these standards.

While internationally a wide range of eHealth standards developed by standards development organisations like ISO and CEN are available, very few of these have been localised and formally adopted by South Africa. Two that have been adopted by the South Africa Bureau of Standards (SABS) are ISO/TS 18308:2004 (SANS 18308 Health Informatics - Requirement for an EHR Architecture) and ISO/TR 20514:2005 (SANS 20514 Health informatics - EHR – Definition, scope and context).

Current work by an active group of experts on the localisation of ISO 21549: Patient Healthcard Data, is nearing completion. This work is coordinated by the SABS and the local standard will be referred to as SANS 828-2 Health informatics – Health smart (HS) card.

However, in general, there is limited work done in the country on the localisation of international standards for the South African setting. Advocacy and adoption is also limited. The implementation of the eHealth Strategy needs to be handled with care as different sectors have invested substantial resources in developing the existing systems, hence constructive engagement between the private and the public sector will be very important. The areas of focus for this process are the following:

- Pharmaceutical Coding.
- Diagnostic Coding Schema.
- Procedural Coding Schema.
- Diagnostic Related Groups (DRGs).
- Standards for Clinical Content.

There is an active Private Healthcare Information Standards Committee (PHISC) which aims to maximise cooperation in eHealth standards across the country. PHISC provides *"an important forum for debate and consensus on health information standards issues for the private sector with the overall aim of identifying appropriate common standards applicable to both the public and private sectors."*[29]

South Africa requires an eHealth Standards Board or similar body to address some of the current risks and deficiencies. The country does not currently have participant ("P") status and as an observer ("O") is unable to vote on the development and maintenance of international eHealth standards.

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[29] Matshidze, P and Hanmer, L. Health Information Systems in the Private Sector. South African Health Review, 2007, pages 89 - 102

In addition, South Africa does not have a local chapter of HL7[30]. Health Level Seven International (HL7) is a global authority on standards for interoperability of health information technology with members in over 55 countries.

The NHIS/SA sub-committee on Architecture and Standards is currently focusing on developing a national guideline for the unique identification of patients utilising public health sector facilities.

4.9   Policies and Regulations affecting eHealth

State Information Technology Agency (SITA)

SITA was established in 1999, according to the SITA Act[31], in order to "consolidate and coordinate the State's information technology resources in order to achieve cost savings through scale, increase delivery capabilities and enhance interoperability."[32] According to the Act, there are services that SITA must provide (mandatory) to government and services that SITA may provide (non-mandatory) to government. Although business agreements between provinces and SITA vary depending on the model adopted for ICT service delivery, by legislation SITA should be a key partner in public sector eHealth service delivery.

The Minimum Information Interoperability Standards (MIOS)[33]

Adherence to the MIOS and policies is mandatory as set out in Chapter Five of the Public Service Regulations. The MIOS defines Government's technical standards for achieving interoperability and information systems compatibility across the public sector. As such it is an essential component in the overall e-Government strategy. It is the responsibility of individual departments to improve their business processes so that they are more effective, and to take advantage of the opportunities provided by increased interoperability.

Other regulations impacting on eHealth include:

- Promotion of Access to Information Act, Act 2 of 2000.
- The Minimum Information Security Standard (MISS).
- The National Archives and Record Service of South Africa Act, Act 43 of 1996.
- The Policy of Free and Open Source Software Use for South African Government.[34]

4.10   eHealth Associations and Conferences

There are currently two eHealth associations in the country:
- The South African Health Informatics Association (SAHIA, established 20 years ago and affiliated with the International Medical Informatics Association IMIA).
- The South African Telemedicine Association (SATMA, established 2 years ago and affiliated with the International Society for Telemedicine and eHealth (ISfTeH)).

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[30] http://www.hl7.org
[31] State Information Technology Agency Act No. 88 of 1998
[32] SITA website - http://www.sita.co.za
[33] www.sita.co.za/standard/MIOSv4.12007.pdf
[34] http://www.info.gov.za/view/DownloadFileAction?id=94490

SAHIA also works closely with the Pan African Health Informatics Association, HELINA (Health Informatics In Africa). SAHIA has been holding a regular biennial Health Informatics South Africa Conference (HISA) while the Medical Research Council has hosted annual Telemedicine and eHealth Conferences, supported by SATMA.

The international Future eHealth Leaders initiative supports future leaders in the sector to hone eHealth skills and build professional networks. The initiative comes to South Africa in 2012, with support from SAHIA, SATMA, ISfTeH, local government and other organisations. A South African chapter of the initiative has been created to host an annual eHealth leadership event henceforth.

4.11   eHealth Capacity Building

Although some progress has been made in telemedicine training (see below), opportunities for education in eHealth are currently limited. Most courses available are at post-graduate level and eHealth is not an established core subject in the training of health professionals. In addition, current departmental structures do not provide well-defined career paths for eHealth professionals.

Both SAHIA and SATMA have an active interest in capacity building. SATMA has been formed to "promote and advance telemedicine and associated fields in South Africa through advocacy, cooperation, training, and research by bringing together people from the private and public sectors, industry and academia to share experience and expertise". [35]

SAHIA is a body which can provide professional membership and on-going professional development through seminars, workshops and special interest group meetings.[36]

Both organisations are exploring the possibility of professional registration with the Health Professions Council of South Africa (HPCSA).

Telemedicine training

The University of KwaZulu-Natal offers a postgraduate programme in Telemedicine, with PhD, Masters, Postgraduate Diploma and Masters in Public Health qualifications. In conjunction with IsTFeH, UKZ-N has facilitated and assisted in the development of a basic introductory telemedicine training programme. The University of Stellenbosch, in collaboration with the Medical Research Council, also offers diploma courses in telemedicine. These educational programmes aim to develop competent and skilled telemedicine practitioners and managers as well as to broaden the base of health workers exposed to telemedicine.

4.12   eHealth Research

Research in eHealth is conducted by several institutions including the Medical Research Council (MRC), Nelson Mandela Metropolitan University, Cape Peninsula University of Technology, University of Stellenbosch, University of Kwazulu-Natal, Walter Sisulu University and the Meraka Institute (CSIR). The

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[35] http://www.satelemedicine.org/mission
[36] www.sahia.org.za/

MRC, which is funded through NDoH, has expertise which includes Health Information Systems (HIS) assessment, HIS and electronic health record (EHR) implementation, eHealth enterprise architecture and standards, the use of web and media technologies, telemedicine and mHealth.

4.13   eHealth in the Private Sector

In general, health information systems in the private sector focus on billing and reimbursement. The following excerpt is taken from a chapter in the South African Health Review.[37]

"This review of health information systems policy, legislation and practice has confirmed that no formal, integrated health information system to support patient care across the private healthcare sector exists in South Africa. Effective information systems to support reimbursement for services by healthcare practitioners, hospital services and support services such as pharmacy and radiology cover a large proportion of private healthcare services and could provide the core of integrated patient records in the future.

The requirements for medical scheme claims have prompted significant consultation and decisions in relation to the implementation of ICD-10 as the national diagnosis coding standard. In this respect, the work of the ICD-10 Implementation Task Team, jointly convened by the NDoH and the Council for Medical Schemes and involving relevant stakeholder groups has provided a model for meaningful and useful cooperation between the public and private sectors on health information issues."

4.14   Notable current initiatives impacting eHealth

The eConnectivity Forum is a high level body of deputy ministers of government departments including NDoH, represented by its Deputy Minister. The eConnectivity Forum aims to ensure cost-effective, sustainable and efficient ICT solutions become tools to enable the efficient delivery of services. The eConnectivity Forum is convened by the Department of Communications (DoC) which is mandated to provide infrastructure for ICTs and its meetings are chaired by its Deputy Minister. The initial focus of the Forum is ensuring connectivity of schools and health facilities across the country in line with Outcomes 1 and 2 of the NSDA: "Improved quality of basic education" and "A long and healthy life for all South Africans".

In October 2011 the Forum resolved that the eHealth strategy should be finalised with an action plan on mHealth and to make more extensive use of digital broadcasting to promote health.

There is also strong national support for the development of eHealth in general. While the HIS environment is characterized by numerous fragmented computerised systems and several vertical programs, South Africa is also innovating in mHealth and telemedicine solutions. The NDoH, provinces, and commercial providers comprise the main developers and implementers of HIS for both hospitals and smaller clinics.[38]

[37] Matshidze, P and Hanmer, L. *Health Information Systems in the Private Sector*. South African Health Review, 2007, pages 89 - 102
[38] Vital Wave Consulting (Funded by Bill and Melinda Gates Foundation): *Health Information Systems in Developing Countries: A Landscape Analysis.* May 2009.

Some of the successful national systems which are in place are:

- District Health Information System (DHIS): a system used nationally which records routine information on facility-based services, community-based campaigns, infrastructure and human resources.
- National Electronic TB Register: a system that monitors cohort groups of TB patients, with more than 200 users across the country.
- Western Cape Primary Healthcare Information System (PHCIS) and Patient Master Index (PMI).

The national Tiered Strategy for ART Monitoring

In December 2010, the National Health Council (NHC) technical task team approved the Tiered ART Monitoring Strategy comprising of a paper-based register (the ART register), non-networked electronic register (TIER.net) and a networked disease specific EMR system (SMARTER[39]) for HIV/ART patient monitoring in line with the WHO's 3 Tiered ART M&E strategy. The strategy provides the tools to standardise ART monitoring nationally with a system that best suits the various needs of facilities, sub-districts, districts and provinces and the resources available to manage the systems.

All three tiers of the 3-Tiered ART Monitoring System are mutually exclusive and generate the same core set of data reported into the DHIS as the centralized aggregated database for all health information. As guidelines, the paper-based register is suited for facilities with no electricity or no computer and with less than 500 patients. The electronic register (TIER.net) is suited for facilities with regular electricity, a computer, no network infrastructure and with 500-2,000 patients. The EMR (SMARTER) is suited for facilities with network infrastructure and over 2,000 patients. TIER.net and SMARTER offer increased functionality where ICT infrastructure and capacity exist to manage the system.

This is a visionary and practical initiative by the NDOH which addresses the variation in eHealth maturity and readiness across the country. The concept of the three tiers means that depending on patient load, capacity and eHealth readiness facilities providing ART will monitor treatment using one of the three systems.

5.   eHealth's contribution to NDoH's strategic aims

5.1   The Health Context

The South African population has grown from 46,5million people in 2004 to 49,9 million in 2010. The burden of disease confronting the country has also increased. South Africa is faced with a quadruple burden of diseases consisting of HIV & AIDS and TB; high maternal and child mortality; non-communicable diseases; and violence and injuries.

To address this, the National Department of Health has developed a five-year macro plan for the health sector, detailed in Outcome 2 of the Negotiated Service Delivery Agreement 2010-2014 (NSDA), which will harness the efforts of the country towards the vision of: *"A long and healthy life for all South Africans"*. The NSDA requires the health sector to achieve four outputs namely:

(i)   Increasing life expectancy.
(ii)   Decreasing maternal and child mortality.
(iii) Combating HIV and AIDS and decreasing the burden of disease from tuberculosis.
(iv)   Strengthening health system effectiveness.

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[39] Systematic Monitoring of ART Evaluation and Reporting

The existence of functional national health information systems, capable of timeously generating good quality data, is critical for the effective implementation of the NSDA 2010-2014. It is important to identify challenges and required corrective interventions early on, in order to ensure that the health sector remains on track. Most importantly, the implementation of National Health Insurance (NHI), which is a component of the Output 4 of the NSDA, requires an effective national electronic, patient-based information system. A statistical aggregated information system will not suffice in an NHI environment. A transaction based, automated system is required, which is based on principles of interoperability and common data exchange standards, and founded on a unique patient identifier.

Furthermore, the utilisation of public health services has also expanded significantly, with a headcount of 122 million at primary healthcare level in 2011. Data quality will remain inferior where there are mainly paper based systems or a mix of paper and computerised systems.

The eHealth Strategy paves the way for the implementation of effective electronic information systems.

5.2   The ICT Context

eHealth can be seen as is investment in information and communications technologies (ICT) in health and healthcare that enables changes and improvements in clinical and working practices in order to secure benefits that exceed the costs over time. The complexity of this requires that eHealth opportunities and choices be identified, priorities set and feasible plans developed so that constraints such as time and affordability are matched. This includes adopting an appropriate architecture coupled with comprehensive and rigorous information standards in order to ensure interoperability and sustainability over the long term.

Continuous technological advancements make it impossible for eHealth leaders to remain abreast of all opportunities. Successful eHealth requires decision-makers to have appropriate teams in place and to identify political, executive and clinical leaders who can identify appropriate opportunities and leverage these within an appropriate governance structure.

5.3 Leveraging eHealth to support NDoH's strategic aims

Besides the regulatory requirements, the need for a national eHealth strategy has been driven by several initiatives, including:

- The proposed National Electronic Health Record system.
- The proposed National Health Insurance scheme.
- The roll-out of a national electronic medical record system for monitoring anti-retroviral treatment for HIV/AIDS.

This strategy seeks to address the NDoH's short and medium term priorities. These priorities are outlined in the Department of Health's 10 Point Plan for 2009–2014 as well as in the strategic agenda for NSDA 2010-2014 for Outcome 2 *(a long and healthy life for all South Africans)*. The 10 Point Plan and the four outputs of the NSDA for Health are adopted below as a framework on which to set out how eHealth will contribute to realising the Department's medium term priorities.

The framework is outlined according to the four outputs of the NSDA.

5.3.1 Strengthening Health System effectiveness[40, 41]

Service Delivery Interventions	Opportunity for eHealth to enable and support intervention
Strengthening Health Information Systems	
Strengthen the District Health Information System (DHIS).	• Improve ICT infrastructure and connectivity so that DHIS software can be implemented at clinics and move to a web-based, centralised platform. • Implement a national Master Facility Register.
Develop framework for a monitoring and evaluation function with Health Management Information System (HMIS).	• Improve ICT infrastructure and connectivity so that related software can be used more effectively.
Enforce common standards, norms and system across the country.	• Establish a national standards body and ISO TC 215 mirror committee. • Facilitate training in eHealth standards. • Provision of on-line training and testing on service delivery norms and standards.
Progressively design and implement a national EHR.	• Develop a national Enterprise Architecture for Health. • Implement the foundations of the EHR.
Re-engineering the PHC approach[42]	
Implement the re-engineered Primary Healthcare approach to aggressively reduce avoidable morbidity and mortality.	• Use ICT to strengthen the referral system. • Identify at-risk patients early on and refer timeously and appropriately. • Community health workers to communicate via cell-phones, send and receive data via cell-phones. • School nurses to screen children in mobile clinics and refer timeously and appropriately.
Health promotion and disease prevention at a household and community level.	• Communications infrastructure used for educational information channels for the public in clinics (videos) TV, satellite broadcasting, via cell-phones, community radio, web sites, school programmes.
Effective information system integrated across other government departments and agencies.	• Patient information management system and EMR linked to a national EHR – generating good quality information for planning, monitoring and reporting • EHR interfaced with Home Affairs, South African Social Security Agency (SASSA) to ensure continuity in government service delivery mechanisms.
Improve patient care and satisfaction.	• ICT infrastructure and architecture enabling the health sector to conduct real time patient satisfaction surveys. • Use of telemedicine for improved patient care in rural areas. • Implement integrated records and document management system
Reduce queuing times in clinics.	• PHC information system linked to EHR. • PHC information system includes appointment scheduling where possible.
Improvement of infrastructure.	• Improved ICT infrastructure and connectivity in all health facilities.

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[40] Includes Priority 3 of the 10 Point Plan 2009 - 2014: Improving the Quality of Health Services.
[41] Includes Priority 4.2 of the 10 Point Plan 2009 - 2014: Improving the Functionality and Management of the Health System.
[42] Includes Priority 4.1 of the 10 Point Plan 2009 - 2014: Refocus the Health System on Primary Health Care

Accreditation of health services facilities for compliance	
Organisational restructuring to better manage infrastructure maintenance including health technology and ICT functions.[43]	• Improve ICT infrastructure and connectivity.
Develop and implement standards.	• Continuous monitoring of compliance with norms and standards through the PHC information system.
Use Public Private Partnerships (PPPs) to improve healthcare infrastructure.[44]	• Develop PPPs to improve ICT infrastructure and connectivity leveraging capacity that exists in institutions such as SAHIA.
Improved HR for health [45]	
Strengthen HR and HRM system/s.	• Relevant skills: ensure sufficient numbers of skilled practitioners are available to support the delivery of the strategy. • Capacity building for existing staff.
Strengthen information on the workforce.	• Improve ICT infrastructure and connectivity to facilitate implementation of the health sector specific HR and HRM database.
Strengthen Financial Management Monitoring and Evaluation	
Monitor monthly provincial spending.	• Improve ICT infrastructure and connectivity to create linkages between performance on financial indicators and non- financial indicators
Improve Healthcare financing through implementation of National Health Insurance (NHI)[46]	
Shift to a national health system financed through pre-payment based mechanism.	• Improve ICT infrastructure and connectivity so that related software can be used more effectively. • Implement a national patient registry and Patient Master Index (PMI). • Localise eHealth interoperability standards and mandate their use. • Implement the foundations of the EHR.
Improve the functioning of clinic services.	• Administrative – ICT support for email, BAS[47], PERSAL[48], LOGIS[49] (where these are used at clinic level). • Patient management system and EMR – registration, recording of clinical data, laboratory results and drugs dispensed. • DHIS – improve the quality of routine information in order to provide good quality information for planning, monitoring and reporting.

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[43] Includes Priority 6.3 of the 10 Point Plan 2009 - 2014: Accelerate the delivery of Health Technology and Information Communication Technology (ICT) Infrastructure.
[44] Includes Priority 6.1 of the 10 Point Plan 2009 - 2014 : Accelerate the delivery of health infrastructure through Public Private Partnerships (PPPs)
[45] Includes Priority 5 of the 10 Point Plan 2009 - 2014: Improved Human Resources Planning, Development and Management.
[46] Includes Priority 2 of the 10 Point Plan 2009 - 2014: Implementation of National Health Insurance (NHI).
[47] BAS: Basic Accounting System. Financial and budgeting system used by all national and provincial public health services in South Africa.
[48] PERSAL: The personnel information system used by all national and provincial public health services in South Africa.
[49] LOGIS: The asset management system used by all national and provincial public health services in South Africa.

5.3.2 Increasing Life Expectancy

Service Delivery Interventions	Opportunity for eHealth to enable and support intervention
Prevent non-communicable diseases through education on benefits of health lifestyles.	• Communications infrastructure used for educational information channels for the public in clinics (videos) TV, satellite broadcasting, via cell-phones, community radio, web sites.
Reduce communicable diseases such as malaria.	• ICT support for data collection and reporting for intervention programmes, including the Epidemic Preparedness Response (EPR) programme for malaria.
Mobilise community through community health workers and extend care into the community using community health workers.[50]	• Community health workers communicate via cell-phones, send and receive data via cell-phones.
Establish innovative methods of early detection of non-communicable and chronic diseases.	• Communications infrastructure used for educational information channels for the public in clinics (videos) TV, satellite broadcasting, via cell-phones, community radio, web sites. • ICT support for mobile PHC facilities.
Conduct routine assessment and screening.	• Communications infrastructure used for reminders to citizens/patients. • ICT support for data collection and reporting for assessment and screening programmes.

5.3.3 Decreasing Maternal and Child Mortality

Service Delivery Interventions	Opportunity for eHealth to enable and support intervention
Provide high quality antenatal and post natal services timeously.	• Use of ICT to strengthen the referral system. • Identify at-risk patients early on and refer timeously and appropriately. • Use of telemedicine to make decisions to move patients to bigger facilities. • Pregnancy and Neonatal EMR system to record clinical details – linked to EHR.
Provide accessible high quality infant and child care services.	• Mobile clinics for immunisations, post-natal care linked to EHR. • Referral system. Pick up at-risk infants and refer.
Provide HCT[51] during pregnancy and PMTCT[52] prophylaxis where necessary.	• System for Monitoring and Evaluation (M&E) of HCT programme. • Pregnancy and Neonatal EMR system to record clinical details – linked to EHR. • System to manage transportation of at-risk patients.
Employ an effective referral system for pregnant women and infants with high risk conditions.	• Referral system: Pick up at-risk patients and refer. • Pregnancy and Neonatal EMR system to record clinical details – linked to EHR. • Patient transport management system.
Enable expert support to remote sites.	• Use of telemedicine in clinics – with appropriate infrastructure installed, especially in remote and rural areas. • Mobile clinics with telemedicine capability.
Effective and available ambulance services.	• Patient transport management system. • System for emergency medical services. • Effective EMS Information Systems, used the latest technology to enhance communication

[50] Includes Priority 8 of the 10 Point Plan 2009 - 2014: Mass mobilisation for the better health for the population.
[51] HCT = HIV Counselling and Testing (replaced the old concept of VCT)
[52] PMTCT Preventing Mother to Child Transmission

Support community health workers so that they can provide post-natal care at patients' homes.	• Community health workers communicate via cell-phones, send and receive data via cell-phones. • Referral system. Pick up at-risk patients and refer.
Public health education for the community.	• Communications infrastructure used for educational information channels for the public in clinics (videos) TV, satellite broadcasting, via cell-phones, community radio, web sites.

5.3.4 Combating HIV and AIDS and decreasing the burden of diseases from TB[53]

Service Delivery Interventions	Opportunity for eHealth to enable and support intervention
Action HCT, scale up HCT.[54]	• eHealth to provide a system for M&E of the HCT programme. • EMR system used to monitor antiretroviral treatment (ART) and TB treatment.
Public health education for the community.	• Communications infrastructure used for educational information channels for the public in clinics (videos) TV, satellite broadcasting, via cell-phones, community radio, web sites, school programmes.
Increase number of patients on ART.	• EMR system to monitor ART and TB treatment outcomes. • Pharmacy system interface. • Logistics support system.
Use laboratory tests judiciously.	• Extend National Health Laboratory Services (NHLS) Gateway project to more facilities. • Link laboratory specimen to individual patients, based on the electronic health record.
Integrate HIV&AIDS and TB treatment, care and support with PHC services.	• Link EMR system to monitor antiretroviral treatment (ART) and TB treatment to EHR. • Community health workers communicate via cell-phones, send and receive data via cell-phones. • School nurses to screen children in mobile clinics.
Monitor treatment, follow up and adherence.	• EMR system to monitor antiretroviral treatment (ART) and TB treatment. • Community health workers communicate via cell-phones, send and receive data via cell-phones.

5.3.5 Strengthen Research and Development[55]

Service Delivery Interventions	Opportunity for eHealth to enable and support intervention

Strengthen research and development.	• Collaboration with research institutions and higher education institutions (HEIs).
	• Determine research areas especially in support of:
	   o eHealth standards localisation
	   o EHR implementation
	   o NHI
	   o eHealth economics and benefits
	   o Telemedicine
	   o mHealth
	   o Web and media technologies
	   o Open source solutions

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[53] Includes Priority 7 of the 10 Point Plan 2009 - 2014: Accelerated implementation of the HIV and AIDS strategic plan and the increased focus on TB and other communicable diseases.
[54] HCT HIV Counselling and Testing
[55] Priority 9 of the 10 Point Plan 2009 - 2014: Strengthen Research and Development.

6. Objectives: eHealth interventions required

The eHealth interventions which are required to support healthcare service delivery are summarised below. These interventions are not all realisable in the short term and can be divided into three categories:

- Build on what exists.
- New or extended work.
- Work for which further planning is required.

Objectives which involve building on what already exists

Improve ICT infrastructure and connectivity.
Develop PPPs to improve ICT infrastructure and connectivity.
Utilise communications infrastructure and broadcasting capabilities for public health promotion and education.
Utilise communications infrastructure (including cell-phones) for reminders to citizens/patients.
Use ICTs to support data collection and reporting for assessment, screening and intervention programmes.
Ensure adequate ICT support for administrative systems including email, BAS, PERSAL, LOGIS (where these are used at clinic level).
Implement system for M&E of VCT/HCT programme.
Ensure adequate ICT support for effective use of DHIS.
Extend the NHLS Gateway project to more facilities.
Implement and maintain a national Master Facility Register.

Objectives which involve new or extended work requiring significant procurement and implementation

Implement the foundations of the EHR, in particular: Implement a national patient registry and Patient Master Index (PMI).
Implement ICTs enabling community health workers to communicate via cell-phones, send and receive data via cell-phones.
Send reminders to patients via SMS (appointments, medication and screening programmes).
Implement ICTs enabling use of telemedicine in clinics, including decision support for patient referrals and transport to bigger facilities.
Implementation of PHC patient management and EMR system/s at clinics.
Implementation of Pregnancy and Neonatal EMR system to record clinical details with link to EHR.
Implementation of EMR system/s to monitor anti-retroviral treatment (ART) and TB treatment. (Capable of link to EHR).
Patient transport management system, including system for deployment of emergency medical services.
Pharmacy systems interface to EMR systems.
Drug supply logistics support system.
Provision of on-line training and testing on service delivery norms and standards.
Accelerate Cost Centre Accounting System implementation.
eHealth standards: • Establish a national standards authority. • Facilitate training in eHealth standards. • Localise eHealth interoperability standards and mandate their use.
Develop a national Enterprise Architecture for Health.
Implement a uniform Integrated Document and Records Management System (EDRMS) at all levels.

Objectives for which further planning is required

ICT support for mobile PHC facilities.
EHR interfaced with Home Affairs, SASSA.
Link relevant EMR systems to EHR. • System to monitor ART and TB treatment. • Pregnancy and Neonatal EMR system. • PHC system/s. • Hospital EMR systems. • PACS/RIS systems.[56]

7. eHealth Roadmap and delivery on the eHealth Strategy

The objectives outlined in Section 6 above describe the actions that must be taken in order to achieve NDoH's vision for eHealth in the short, medium and long term. In order to deliver on the eHealth strategy, work in the following ten priority areas needs to be coordinated. These areas have strong interdependencies and cannot be planned for in isolation.

7.1 Priority areas for the delivery on the National eHealth Strategy, 2012-2017

The national eHealth Strategy consists of the 10 strategic priorities outlined below.

Strategic Priority 1: Strategy and Leadership

International experience has shown that the successful implementation of eHealth is complex and that it requires a strong national eHealth strategy. This eHealth strategy, set in the context of the NDoH's strategic aims and aligned to the priorities set by the NDoH, recognises that leadership (political, executive and clinical) is critical for the successful realisation of the strategy.

Strategic Priority 2: Stakeholder Engagement

eHealth needs effective collaboration in order to succeed. This can only be achieved by engaging with all stakeholder groups affected by eHealth, including mHealth and Telemedicine. This helps to mobilise support, identify opportunities, highlight priorities, manage and mitigate risk.

Strategic Priority 3: Standards and Interoperability

Standards are the cornerstone of the eHealth strategy implementation. Besides interoperability standards which are essential for the accurate exchange of data, there is a requirement for national standards for procurement (hardware and software), software accreditation, data structure, terminology, clinical coding, security, messaging and the electronic health record.

Strategic Priority 4: Governance and Regulation

eHealth affects multiple stakeholder types and extends across multiple domains, including personal health, healthcare provision, ICT and management. A governance structure is important for realisation of the eHealth strategy. While the potential benefits of eHealth implementations are high, their realisation can be risky, costly and challenging.

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[56] PACS/RIS: PACS - Picture Archiving and Communication System (most common application is digital X-Ray). RIS – Radiology Information System.

Strategic Priority 5: Investment, Affordability and Sustainability

Before beginning any eHealth project, financing must be procured and its sustainability protected over the duration of the project. This requires proper planning and identification of benefits, so that value for money and affordability are balanced and results delivered as quickly as feasible. There are relatively few economic assessments of potentially beneficial eHealth solutions in the developing world. These are to support "policy makers and health departments to make informed decisions when allocating scarce resources"[57]. The South African eHealth Strategy will contribute to regional efforts in this regard.

Strategic Priority 6: Benefits Realisation

Specific actions are required to ensure that eHealth implementations deliver on their promise and that anticipated benefits are realised for all stakeholders. These actions, which include all change management interventions, need to be clearly identified and planned. If they are not addressed adequately net benefits may not be demonstrated within a realistic timeframe and funding envelope.

Strategic Priority 7: Capacity and Workforce

Having adequate human resource capacity is essential to successful delivery on this eHealth strategy. This involves developing career paths, training and skill retention strategies in order to build up a workforce that can innovate, develop, deploy, maintain and support all eHealth interventions, especially health information systems and health management information systems. Define a standardised eHealth competency framework for health workers and health IT practitioners providing an understanding of required eHealth knowledge, skills and attributes for each professional group.

Strategic Priority 8: eHealth Foundations

The incremental approach adopted by this strategy aims to deploy eHealth capability in a step-wise manner. There are four areas which will provide the foundations for all other eHealth activities: infrastructure, connectivity, registration of patients, facilities and providers, and a basic national electronic health record.

Strategic Priority 9: Applications and Tools to support Healthcare Delivery

There is a wide range of digital applications and tools with the potential to support and improve healthcare delivery. The applications include electronic medical record systems, healthcare information systems, surveillance systems, business intelligence for health, electronic content management, decision support and knowledge management. Tools include software and hardware devices, especially those used in mHealth and Telemedicine.

Strategic Priority 10: Monitoring and Evaluation of the eHealth Strategy

It is essential to monitor and evaluate performance on the eHealth strategy on an ongoing basis. This will ensure that the objectives are being adhered to and provide input for future planning.

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[57] S Broomhead and M Mars. Telemedicine and e-Health. January/February 2012, 18(1): 24-31. doi:10.1089/tmj.2011.0143

Strategic priority	Key Activities	Outputs	Target Dates	
			Commence	Complete
1: Strategy and Leadership	Identify a governance structure to lead the implementation of the eHealth strategy	NHISSA strengthened and designated as the governance structure for the eHealth strategy	June 2012	August 2012
		NHISSA submits quarterly progress reports to NDoH	August 2012	March 2017
	Establish partnerships for the implementation of the eHealth strategy	Key stakeholders identified and terms of engagement documented	May 2012	December 2012
	Ensure synergies with the ICT strategies of other government departments	ICT Strategy updated to reflect synergies with the ICT strategies of other government departments	June 2012	December 2012
	Mobilise resources for implementation of the eHealth strategy	eHealth strategy costed	June 2012	September 2012
		Ten (10) year budget produced addressing issue of affordability and sustainability, and resources mobilised	September 2012	March 2017
	Develop necessary eHealth components of an Enterprise Architecture for Health	Enterprise Architecture for health completed consisting of: • Data Architecture • Application Architecture • Technology Architecture • Business Architecture	August 2012	December 2012
2: Stakeholder Engagement	Support the development of nine provincial ICT plans aligned to the eHealth strategy	Provincial ICT Plans for 2013/14 produced and budgeted and aligned to the eHealth strategy	July 2012	December 2012
	Support the provincial health information systems committees to incorporate the eHealth strategy in their engagement work with districts and local communities.	Provincial health information systems committees established in all Provinces	July 2012	May 2013
	Facilitate the establishment of professional registration for eHealth practitioners.	Curriculum for eHealth practitioners established and approved by SAQA	July 2012	December 2013
		eHealth Practitioners registered with relevant Professional Body	July 2012	December 2014
	Identify other important stakeholder groups and engage with them regarding the impact of implementation of the eHealth strategy through awareness campaigns and imbizos.	Key stakeholders identified and terms of engagement documented	June 2012	August 2012
	Ensure consistency between eHealth strategy and other government programmes and strategic plans, e.g. health infrastructure plans	Annual Health facility infrastructure plans informed by the eHealth Strategy	July 2012	Annually
3: Standards and Interoperability	Establish an eHealth Standards authority linked to the eHealth board.	eHealth Standards authority appointed by the Minister	August 2012	September 2012
		eHealth Standards authority submits quarterly progress reports to the NDoH	September 2012	March 2017
	Finalise a standards framework for eHealth	Standards framework for eHealth published	August 2012	December 2012
	Establish a mechanism for accreditation (which must be renewed annually)	Accreditation system in place for new eHealth solutions proposed for the health sector	September 2012	December 2012

Strategic priority	Key Activities	Outputs	Target Dates	
			Commence	Complete
4: Governance and Regulation	Develop and approve a national eHealth policy framework.	national eHealth policy framework developed, finalised and adopted by the National Health Council	June 2012	October 2012
	Develop and approve a national eHealth regulatory framework.	eHealth regulatory framework developed, finalised and adopted by the National Health Council	June 2012	October 2012
	Performance management agreements with relevant senior managers responsible for ICTs (GITOS) should reflect implementation of the eHealth strategy.	eHealth strategy objectives reflected in the performance management agreements of relevant senior managers responsible for ICTs (GITOS)	June 2013	Annually
	Determine effective risk mitigation for eHealth projects.	Risk mitigation strategy for eHealth projects published	June 2012	December 2012
	Establish regulations on privacy, confidentiality and security.	Regulations on privacy, confidentiality and security published	June 2012	December 2012
	Establish a national standards compliance body	National standards compliance body established	July 2012	December 2012
	Develop a licensing policy	Licensing policy established	July 2012	December 2012
5: Investment, Affordability and Sustainability	Cost the eHealth strategy and develop a ten year budget addressing issue of affordability and sustainability.	eHealth strategy costed

Ten (10) year budget produced addressing issue of affordability and sustainability, and resources mobilised | July 2012

September 2012 | September 2012

March 2017 |
	Develop rules for financing of eHealth for the enterprise architecture.	Health sector rules for financing of eHealth for the enterprise architecture produced	June 2012	August 2012
	Develop rules for procurement of eHealth enterprise architecture.	Procurement rules for eHealth enterprise architecture adopted by the National Health Council	July 2012	December 2012
	Align provincial ICT plans to the enterprise architecture.	Nine (9) Provincial ICT plans aligned to the enterprise architecture.	December 2012	March 2017, review annualy
	Provincial ICT procurement aligned to enterprise architecture (lifting of moratorium once this is achieved)	Provincial ICT procurement aligned to enterprise architecture and the moratorium lifted once this is achieved.	December 2012	March 2017, review annualy
6: Benefits Realisation	Develop a benefits realisation plan which specifies health outcome benefits expected at local level for all eHealth interventions	Benefits realisation plan produced	June 2012	September 2012
	Engage all user groups	Quarterly stakeholder meetings convened	July 2012	March 2017
	Establish a mechanism for conducting usability assessments, to ensure that the public health sector is an "informed buyer" of ICT solutions	Mechanism for conducting usability assessments established	July 2012	December 2012

Strategic priority	Key Activities	Outputs	Target Dates	
			Commence	Complete
7: Capacity and Workforce	Develop an Health IT, Information and Knowledge Management workforce development strategy, aligned to the National Health Workforce Strategy	Health IT, Information and Knowledge Management workforce development strategy produced	June 2012	December 2012
	Health workforce development with respect to eHealth	Health IT workforce development strategy produced	July 2012	December 2012
	Professional accreditation for Health Informatics professionals with HPCSA	Professional accreditation for Health Informatics professionals with HPCSA	July 2012	December 2014
	Leverage partnerships and collaborations for Health Informatics training	Memoranda of Understanding (MoU) entered into with relevant institutions for partnerships and collaborations for Health Informatics training	July 2012	December 2013
8: eHealth Foundations	Implementation of a national patient master index for unique patient identification with national ART and TB treatment system as first phase.	National patient master index developed for unique patient identification, starting with national ART and TB treatment system as first phase.	July 2012	December 2012
	Implementation of basic national Electronic Health Record (EHR) including an information exchange to support interoperability	Basic national electronic health record implemented, including an information exchange to support interoperability	July 2012	May 2013
	Ensure connectivity - broadband connectivity, last mile connectivity	Connectivity - broadband connectivity, last mile connectivity achieved	July 2012	December 2012
9: Applications and Tools to support Healthcare Delivery	Develop and implement eHealth policy	eHealth policy developed and implemented	June 2012	September 2012
	Identify eHealth projects in line with objectives of the eHealth strategy	List of eHealth projects produced in line with objectives of the eHealth strategy	June 2012	Reviewed quarterly
	Finalisation of the mHealth strategy	mHealth strategy finalised	Draft version available	Finalised in August 2012
	Develop and implement mHealth policy	mHealth policy finalised	June 2012	December 2012
	Identify mHealth projects in line with mHealth policy	mHealth projects identified in line with mHealth policy	June 2012	Reviewed quarterly
	Finalise telemedicine strategy	Finalise telemedicine strategy	Draft version available	December 2012
	Develop and implement Telemedicine policy	Develop and implement Telemedicine policy	June 2012	December 2012
	Identify Telemedicine projects in line with Telemedicine policy	Telemedicine projects identified in line with Telemedicine policy	June 2012	Reviewed quarterly
10: Monitoring and Evaluation of the eHealth Strategy	Establish a mechanism for monitoring and evaluation of the eHealth strategy	M&E Strategy for eHealth developed, aligned to the overarching M&E Strategy of the health sector	July 2012	September 2012
		eHealth Strategy monitored and quarterly reports presented to the National Health Council (TAC and Policy Committee)	September 2012	March 2017

8.   Acronyms used in this document

AIDS	Acquired immune deficiency syndrome
ART	Anti-retroviral treatment
BAS	Basic Accounting System
CEN	European Committee for Standardisation
CSIR	Council for Scientific and Industrial Research
DHIS	District Health Information System
DoC	Department of Communications
DRG	Diagnostic Related Group
EA	Enterprise Architecture
EHR	Electronic Health Record
EMR	Electronic Medical record
EPR	Electronic Patient Record
GITOS	Government Information Technology Officer
HCT	HIV counselling and testing
HEI	Higher education institution
HELINA	Health Informatics in Africa
HIS	Health Information System
HMIS	Health Management Information System
HIV	Human immunodeficiency virus
HPSCA	Health Professions Council of South Africa
HR	Human Resources
HRM	Human Resource Management
ICD-10	International Classification of Diseases 10th revision
ICT	Information and Communications Technology
IMIA	International Medical Informatics Association
IOM	Institute of Medicine
ISO	International Standards Organisation
ISO TC 215	International Standards Organisation Technical Committee (Health Informatics)
ISfTeH	International Society for Telemedicine and eHealth
LOGIS	Transversal asset management and procurement system
MISS	Minimum Information Security Standards

MIOS	Minimum Interoperability Standards
M&E	Monitoring and Evaluation
MEC	Member of the Executive Council
MRC	Medical Research Council
NDoH	National Department of Health
NGO	Non-governmental organisation
NHC/MIS	National Healthcare Management Information System
NHC	National Health Council
NHI	National Health Insurance
NHIS/SA	National Health Information System South Africa
NHLS	National Health Laboratory Service
NSDA	National Service Delivery Agreement
PACS	Picture Archiving and Communication System
PERSAL	Transversal system for human resource management and payment of personnel
PHC	Primary Healthcare
PHCIS	Primary Healthcare Information System
PHISC	Private Health Informatics Standards Committee
PMTCT	Preventing Mother to Child Transmission
PMI	Patient Master Index
PPP	Public Private Partnership
RIS	Radiology Information System
SABS	South African Bureau of Standards
SAHIA	South African Health Informatics Association
SASSA	South African Social Security Agency
SATMA	South African Telemedicine Association
SITA	State Information Technology Agency
SMARTER	Systematic Monitoring of ART Evaluation and Reporting
TAC	Technical Advisory Committee
TB	Tuberculosis
UKZ-N	University of Kwazulu-Natal
VCT	Voluntary Counselling and Testing
WHA	World Health Assembly