

National Digital Health Strategy for South Africa

2019 - 2024



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Published by the National Department of Health

Republic of South Africa

Pretoria

ISBN (print) 978-1-920585-30-3

ISBN (digital) 978-1-920585-31-0

Available online at www.health.gov.za

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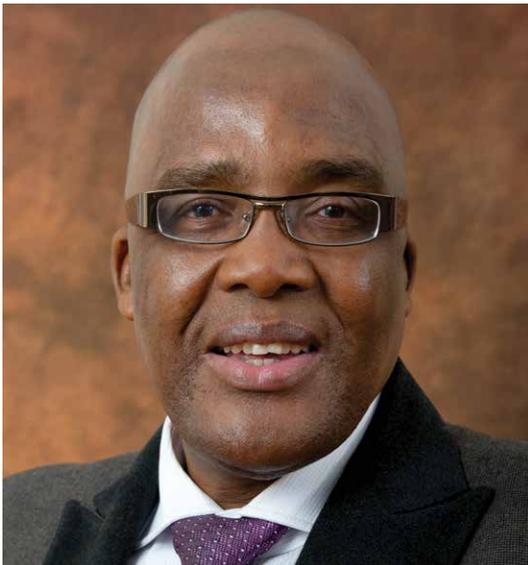




ACRONYMS

ACFEE	African Centre for eHealth Excellence	NGO	Non-Governmental Organisation
ADB	Asian Development Bank	NHC	National Health Council
AIDS	Acquired Immune Deficiency Syndrome	NHI	National Health Insurance
AI	Artificial Intelligence	NHISSA	National Health Information System South Africa
ART	Antiretroviral Therapy	NHLS	National Health Laboratory Service
BAS	Basic Accounting System	NIDS	National Indicator Data Set
CBS	Case-based Surveillance	OHSC	Office of Health Standards Compliance
CDC	Centres for Disease Control	PHC	Primary Healthcare
CSIR	Council for Scientific and Industrial Research	PHISCs	Provincial Health Information Systems Committees
DHIF	Digital Health Impact Framework	PMI	Patient Master Index
DHIMA	Digital Health Impact Model for Africa	POPI	Protection of Personal Information
DHIS	District Health Information System	PPI	Public Private Investment
DHMIS	District Health Management Information Systems	SABS	South African Bureau of Standards
DTPS	Department of Telecommunications and Postal Services	SAHPRA	South African Health Products Regulatory Authority
eHI	eHealth Impact	SAMRC	South African Medical Research Council
eHIMA	eHealth Impact Model for Africa	SAPC	South African Pharmacy Council
eMPI	Electronic Master Patient Index	SDGs	Sustainable Development Goals
EMR	Electronic Medical Record	SITA	State Information Technology Agency
FOSS	Free and Open Source Software	SVS	Stock Visibility System
HCT	HIV Counselling and Testing	TB	Tuberculosis
HEA	Health Enterprise Architecture	TIER	Three Interlinked Electronic Registries
HIS	Health Information System	UHC	Universal Health Coverage
HIV	Human Immunodeficiency Virus	UNISA	University of South Africa
HNSF	Health Normative Standards Framework	USAID	United States Agency for International Development
HPCSA	Health Professions Council of South Africa	USSD	Unstructured Supplementary Service Data
HPRN	Health Patient Registration Number	UxD	User Experience Design
HPRS	Health Patient Registration System	VCT	Voluntary Counselling and Testing
HR	Human Resources	WHA	World Health Assembly
HRH	Human Resources for Health	WBPHCOT	Ward-Based Primary Healthcare Outreach Teams
HRIS	Human Resource Information System	WHO	World Health Organization
ICD-10	International Classification of Diseases 10th revision		
ICT	Information and Communications Technology		
IHE	Integrating the Healthcare Enterprise		
IoT	Internet of Things		
ITU	International Telecommunication Union		
MAC	Ministerial Advisory Committee		
M&E	Monitoring and Evaluation		
MDM	Master Data Management		
MDS	Master Data Services		
MPI	Master Patient Index		
MTEF	Medium-Term Expenditure Framework		
NCDs	Non-Communicable Diseases		
NDP	National Development Plan		

FOREWORD



South Africa has fully embraced the potential of digital health technologies to improve the quality and coverage of healthcare, increase access to services and skills, and promote positive changes in health behaviours to prevent the onset of acute and chronic diseases. The proliferation of mobile devices allows us to communicate with one another and with computers in new and ever accelerating ways. This, combined with emerging technological advances sets the scene for digital health to have a larger contribution to our health and well-being more than ever before.

The development of the *National Digital Health Strategy for South Africa, 2019 - 2024* takes place at an opportune time of the massive reorganisation of the healthcare system required for the National Health Insurance (NHI) implementation. These developments, alongside a rapidly changing technology landscape within the context of the fourth industrial revolution present great opportunities for innovation.

The development of the new strategy was led by the Ministerial Advisory Committee (MAC) on eHealth, which is chaired by Director-General, Ms MP Matsoso. It builds on the lessons learnt during the implementation of the *eHealth Strategy 2012-2016*, which include strengthening governance structures, creating robust integrated platforms for development of information systems, the use of a common unique identifier for patients interfacing with the health system at various levels, and the enhanced mobile health ability to reach health system users through systems like MomConnect. Recommendations from the review of the previous strategy formed the basis for the development of the new strategy.

The strategic thrust for the new strategy is to support the health sector priorities as articulated in the National Development Plan (NDP) and in line with the current NHI transformation imperatives towards Universal Health Coverage (UHC). The new strategy sets out a vision of *'better health for all South Africans enabled by digital health'* because digital health is expected to be a significant driver of health system transformation, and also advance the national Department of Health's vision of *'A long and healthy life for all South Africans'*. It is embodied in the five strategic principles of a person-centred focus, expanded access, innovation for sustainable impact, digital health workforce for economic development and a whole-of-government approach.

This strategy puts people at the centre to address the needs of those who need healthcare, those who can be assisted to maintain healthy living, the health workers who provide a wide spectrum of health services, and managers who need to make critical decisions to enhance the health system for effective service delivery. Meeting these diverse needs requires a transformed health paradigm and information systems. It also recognises the transformative power of information systems to bring services to those who would have been otherwise marginalised. The new strategy responds to the Seventy-First World Health Assembly (WHA) Resolution (WHA71.7) on Digital Health adopted by the World Health Organization (WHO) member states in May 2018, which urged member states to:

“...assess their use of digital technologies for health, including in health information systems at the national and sub-national levels, in order to identify areas of improvement, and to prioritise, as appropriate, the development, evaluation, implementation, scale-up and greater utilisation of digital technologies, as a means of promoting equitable, affordable and universal access to health for all, including the special needs of groups that are vulnerable in the context of digital health”.

More investments will be required to consolidate and expand the current efforts to implement the new strategy such that the benefits of digital health in improving service delivery and patient outcomes are realised. Effective collaboration between public and private sector stakeholders will be crucial in order to build cost-effective digital health solutions, reduce data costs and build better digital health infrastructure within the aspirations of the fourth industrial revolution.

A handwritten signature in black ink, appearing to be 'PA MOTOALEDI', written over a horizontal line.

DR PA MOTOALEDI, MP
MINISTER OF HEALTH
DATE: 15/05/2019

ACKNOWLEDGEMENTS



Many officials from the national and provincial departments of health have made significant contributions to the development of the National Digital Health Strategy for South Africa, 2019 - 2024. The strategy development was coordinated by the Chief Director: Health Information, Research, Monitoring and Evaluation, Thulile Zondi and her team, Mbulelo Cabuko, Thabiso Nothana, Xolile Ndzulu and Kadisha Ramaru, with the support and guidance of the Deputy Director-General: Health Systems Governance and Human Resources, Dr Gail Andrews.

As the Chairperson of the MAC on eHealth, I would like to express my appreciation for robust participation, contributions and guidance provided by the MAC members. My sincere gratitude goes to the members who assisted with the rapid review of the previous eHealth Strategy, led the consultations with provincial health departments on the development of the new strategy and participated in the actual strategy development.

These MAC members are Dr Sean Broomhead, Jasper Chimanzi, Dr Rajeev Rao Eashwari, Dr Jill Fortuin-Abrahams, Nondzwakazi Gumede, Dr Lyn Hanmer, Dr Vuma Magaqa, Hendrick Metsileng, Dr Moretlo Molefi, Bandile Ntombela, Alufheli Ravuluvulu, Charl Titus and Dr Krish Vallabhjee.

I would like to extend a special appreciation to Dr Sean Broomhead, a member of the MAC, for the long hours he invested in shaping the strategy. The valuable technical inputs made to the strategy by officials from within the Health Systems Governance and Human Resources Branch, Gaurang Tanna, Nhlanhla Ntuli and Dr Tshilidzi Muthivhi as well as Ian De Vega from the Western Cape Department of Health are greatly appreciated.

The national Department of Health is grateful for the contributions made by various stakeholders who participated in the eHealth Strategy Consultative Workshop. These stakeholders include provincial health departments; statutory councils including the Health Professions Council of South Africa (HPCSA), South African Pharmacy Council (SAPC), Office of Health Standards Compliance (OHSC) and South African Health Products Regulatory Authority (SAHPRA); State-owned Enterprises such as the South African Medical Research Council (SAMRC), Council for Scientific and Industrial Research (CSIR)-Meraka Institute, Cochrane South Africa and the National Health Laboratory Service (NHLS); the departments of science and technology and telecommunications and postal services; development partners such as United States Agency for International Development (USAID), Centers for Disease Control (CDC) and Monitoring and Evaluation to Assess and Use Results (MEASURE) Evaluation; academic institutions such as the University of Pretoria, University of Limpopo and the University of South Africa (UNISA) as well as non-governmental organisations (NGOs).

Lastly, let me thank all the provincial heads of departments for their invaluable contributions to the strategy development process through their engagement with the members of the MAC during their consultative provincial visits to solicit provincial inputs and priorities for the strategy.

A handwritten signature in black ink, appearing to read 'Matsoso'.

MP MATSOSO
DIRECTOR-GENERAL
DATE: 14/05/2019





EXECUTIVE SUMMARY

Digital health technologies provide opportunities to strengthen health systems, transforming the way health services are provided and the way in which people engage with those services. The National Digital Health Strategy for South Africa, 2019 - 2024 will strengthen digital health governance structures, create robust integrated platforms for development of information systems and establish the requisite broadband network infrastructure in conjunction with other government departments.

At the heart of the strategy is the vision of 'Better Health for all South Africans enabled by person-centred Digital Health'. The strategy will benefit patients seeking access to healthcare services, healthcare workers to provide better services, and health systems managers to fulfil their role, empowering all citizens to better navigate their personal health journeys using digital technologies.

The digital health interventions are aligned to the health sector priorities that will assist the country in dealing with the quadruple burden of disease, improving quality of care, improving maternal and child health, as well as support the health system transformation for NHI. The digital health priorities for this period will be:

- Development of a complete health electronic record which will improve patient management.
- Digitisation of health systems business processes. That will include digitisation of various health systems to improve efficiency and quality at an institutional level such as human resource, medicine access etc.
- Establishment of an integrated platform and architecture for health sector information system which will also ensure interoperability and linkage of existing patient-based information system.
- Scaling up high impact mHealth for community-based interventions. Within the context of the NHI, it will expand health promotion coverage to the vulnerable groups such as the children, the elderly, women and others who are prioritised.
- Development of digital health knowledge workers working to support digital health as well as economic development.

The strategy is underpinned by five strategic principles of a person-centred focus, expanded access, innovation for sustainable impact, digital health workforce for economic development and a whole-of-government approach.

The strategy proposes nine strategic interventions to be achieved by 2024.

- **Develop leadership capacity for digital health innovation and adaptive management**
Local digital health leadership structures will be created at all levels to provide leadership at each level of government (facility, district, provincial and national) and ensure that digital health is used to resolve the most pertinent issues faced by patients and health workers.
- **Undertake appropriate multi-stakeholder engagement for shared opportunities and successful digital health implementation**
The strategy will foster effective collaboration mechanisms between public and private sector stakeholders to build cost-effective digital health solutions, reduce data costs and build better ICT infrastructure for digital health. Digital health innovation focal points will be established at universities and parastatals.
- **Develop sustainable interventions and appropriate investment and funding mechanisms for digital health implementation**
A national grant for digital health implementation will be established in conjunction with National Treasury to align and coordinate investments, targeting a proportionate allocation of three to five per cent of expenditure on health. In addition, a digital health impact model will be developed to allow decision-makers to assess the impact of digital health solutions.
- **Review and strengthen governance structures and oversight mechanisms for the implementation of the strategy**
By 2020, all current digital health governance structures will be reviewed and aligned. These structures will ensure high-level accountability on digital health resources and deployment of health information systems.
- **Establish an integrated information architecture for interoperability and effective, safe sharing of health information across health systems and services**
An open standards and open architecture approach will be adopted, expanding the National Health Normative Standards Framework for Interoperability in eHealth in South Africa, 2014 and extending the health enterprise architecture. A Master Patient Index (MPI) will be established for all South Africans, leveraging work already accomplished, with all patient information systems implementing a unique



identifier to facilitate the movement of patients within and across provinces. Health normative standards framework conformance testing will be conducted on all health information systems. A South African digital health platform will be established to support digital innovation, promote utilisation of digital solutions for improved health services and to contribute to economic development. A governance structure will be established to reinforce digital health standards and interoperability.

- **Develop appropriate digital applications and services that improve health services for patients and health workers**

A roadmap will be developed to digitise all health systems business processes across the health service platform. A User experience Design (UXD) framework will be established for South Africa to promote user co-design and co-creation of health information systems. A roadmap for achieving an electronic health record for South Africa will be developed to integrate existing solutions on a common platform, prioritising functionality that will enhance service delivery and continuity of care.

A Human Resource Information System (HRIS) will be developed to provide information necessary to support the health workforce. In an effort to rationalise mobile health, a health play store will be established for the hosting of all approved mobile health applications.

- **Establish a robust physical and network infrastructure and broadband connectivity for priority digital health applications and services**

To address network connectivity constraints that hamper digital health efforts in South Africa, a health network infrastructure will be established in conjunction with the relevant government departments to provide digital health broadband connectivity. In addition, a cloud service for health will be established.

- **Formulate national legislative, policy and regulatory framework for digital health**

A review of the existing digital health regulatory landscape will be undertaken and new regulations developed where appropriate, focussing on data protection, data sharing between private and public sectors as well as cybersecurity.

- **Develop enhanced digital health technical capacity and skilled workforce for digital technology support and implementation**

A digital health workforce plan will be developed focussing on the establishment of critical technical skills required to drive the implementation of the strategy.

1. INTRODUCTION

1.1. The strategy in context

The strategy will contribute towards the South African National Development Plan Vision 2030 of “Information and Communications Technology (ICT) that underpins the development of a dynamic and connected information society and a vibrant knowledge economy that is more inclusive and prosperous”. The release of the new strategy is timely, following the establishment of the Presidential Commission on the Fourth Industrial Revolution by President Cyril Ramaphosa [1], announced during the February 2019 State of the Nation Address.

The members of this commission were appointed in April 2019 with a mandate to assist the government in taking advantage of the opportunities presented by the digital industrial revolution and position South Africa as a competitive global player. The World Health Assembly (WHA) 2018 recognised the potential of digital technologies to advance the Sustainable Development Goals (SDGs), and in particular to support health systems in all countries in health promotion and disease prevention, and by improving the accessibility, quality and affordability of health services. [2] [3] Converting this potential into probable benefits requires a robust strategy and investment plan.

Recognising the potential benefit that digital technologies could bring about in improving public health, the 2018 WHA adopted a resolution to leverage digital technologies for Universal Health Coverage (UHC). The WHO urged member states to consider, as appropriate, how digital technologies could be integrated into existing health systems infrastructure and regulation, to reinforce national and global health priorities by organising existing platforms and services, for the promotion of people-centred health and disease prevention and in order to reduce the burden on health systems.

1.2. Defining digital health

Digital health builds on the previous eHealth developments and interventions. The WHO defined eHealth as “the use of ICT for health to, for an example, treat patients, pursue research, educate students, track disease and monitor public health.” [4] The latest developments led by the WHO have moved from eHealth to digital health, which has an emphasis on digital consumers, with a wider range of smart-devices and connected equipment being used, together with other innovative and evolving concepts such as that of Internet of Things (IoTs) and the more widespread use of Artificial Intelligence (AI), big data and analytics. [3] The WHO is leading the process of developing a Global Digital Health Strategy and has provided recommendations on digital health interventions for health systems strengthening. [5]

The WHO defines digital health as “the field of knowledge and practice associated with any aspect of adopting digital technologies to improve health, from inception to operation”. Digital health is understood to incorporate eHealth and also deals with issues such as scalability, replicability, interoperability, security and accessibility. Digital health is rooted in eHealth. [5]

Digital health beneficiaries include:

- a. patients – people seeking access to healthcare services
- b. citizens – people who want to navigate their own health journey
- c. healthcare workers – who want access to the latest information and be supported better to fulfil their role
- d. healthcare managers – who wish to plan, manage, and monitor the health system more effectively, securing health benefits for all citizens

1.3. Digital health in South African health systems

The strategic thrust for digital health is to support and enable the health sector vision of “A long and healthy life for all South Africans”. Chapter 10 of the NDP stipulates targets of:

- a. a life expectancy rate of at least 70 years for men and women
- b. a generation of under-20s largely free of HIV
- c. a reduced quadruple burden of disease
- d. an infant mortality rate of less than 20 deaths per thousand live births and under-five mortality rate of less than 30 deaths per thousand live births
- e. a significant shift in equity, efficiency, effectiveness and quality of healthcare provision
- f. UHC achieved
- g. a significant reduction in the risks caused by the social determinants of disease and adverse ecological factors

The NDP sets long-term goals to respond to the quadruple burden of diseases, maternal and child health, as well as health systems challenges. Post 1994, the country has undertaken a number of health systems reforms with an aim to create an integrated health system, efficient and effective service delivery, and increase access to healthcare services. Currently, South Africa is implementing the NHI to deliver UHC. The NHI will allow the pooling of funds and provision of quality health services for all South Africans based on their health needs, irrespective of their socio-economic status. The UHC measurement will require monitoring of essential interventions on promotive, curative and palliative services, as well as the financial risk protection.

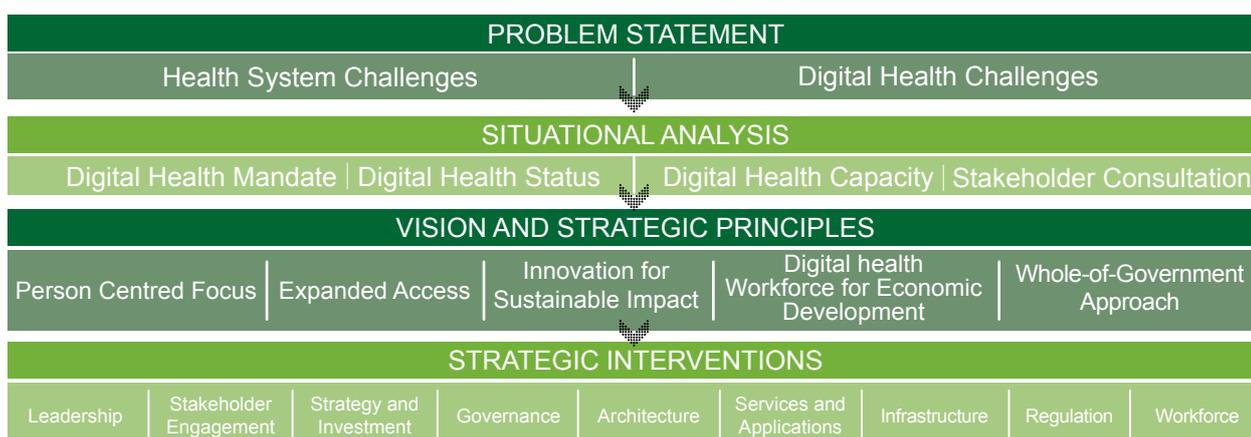


Figure 1: National Digital Health Strategy for South Africa - development process, vision and interventions

1.4. Strategy development process

The process for developing the strategy involved engagement, consultation and technical development processes. Figure 1 provides a synopsis of the development processes. As depicted in Figure 1, the strategy development process began with the review of the previous strategy implementation, which led to the identification of successes, lessons learnt, challenges, gaps, opportunities and risks. The review provided a foundation for the strategy development process and consultations with key stakeholders.

The methodology for developing a new strategy was adapted from the WHO/International Telecommunication Union (ITU) National eHealth Strategy Toolkit. The toolkit provides a “comprehensive, practical guide that all governments, their ministries, departments and agencies can adapt to suit their own

circumstances and their own vision and goals”. [6] The toolkit starts from the premise that an eHealth strategy should be based on national health priorities, the available and potential resources, and the current eHealth environment.

Furthermore, the WHO Guideline Recommendations on Digital Interventions for Health System Strengthening, released in April 2019 was taken into consideration. The guideline provides targeted interventions and focuses on the use of mobile devices such as mobile phones and tablets due to their evident pervasive nature. The guideline emphasises the importance of reaching vulnerable populations, taking into consideration patient privacy and ensuring that digital health does not cause harm to the public. These recommendations are linked to an expected contribution to UHC.

Stakeholder consultation:

Active engagement with stakeholders at all levels is a priority. To be successful, stakeholder power, resources and skills need to be harnessed. During the development of the new strategy, several stakeholder consultative meetings were undertaken. The stakeholder consultations were led by the MAC on eHealth and included various consultation exercises, in close collaboration with the National Health Information Systems for South Africa (NHISSA) Committee. As part of the new strategy development, a National eHealth Strategy Consultative Workshop was held on 8 August 2018. The workshop theme was “Building an eHealth ecosystem for sustainable healthcare transformation in South Africa”. The objective of the workshop was to solicit stakeholder inputs on the new strategy. The workshop was further used for the preparation of eHealth themes to be taken to the Presidential Health Summit, which was scheduled for August 2018.

Participation in the workshop was from a broad stakeholder group including the national and provincial health departments, the Department of Science and Technology as well as the Department of Telecommunications and Postal Services. Other stakeholder groups who participated included the statutory councils, research institutions, development partners, universities and Non-Governmental Organisations (NGOs).

Between September and November 2018, provincial consultation visits were conducted by the MAC on eHealth. These consultative engagements took place with the provincial heads of departments and key senior managers. During these visits, a number of sites were visited in each province to engage with users at various levels of the healthcare system. Provincial visits highlighted various investments made in provinces, differing capacities for implementation, the value of digital health in clinical practice and management decision-making, as well as challenges of infrastructure and internet connectivity on the ground.

Presidential Health Summit:

The Presidential Health Summit held on 19 and 20 October 2018 set the tone for the required interventions to resolve the current challenges and build a strong health system to deliver high quality services. The purpose of the summit was to deliberate and propose solutions to address the challenges facing the South African health system. Commissions addressed nine components of the health system, namely: human resources, access to medicines, infrastructure, quality of care, financial management, leadership and governance, community engagement and health information systems.

The commission on health information systems made recommendations regarding: a) improving the health information system coordination, automation, interoperability and internet connectivity; b) optimisation of coding systems for effective diagnosis, intervention and billing purposes; c) improving the healthcare technology infrastructure and architecture; d) capacity building and skills transfer, and optimising data and business intelligence.

2. PROBLEM STATEMENT

The strategic challenges facing digital health over the years remain value for money on systems procured and implemented; as well as fragmented and poorly coordinated systems. The information systems assessments conducted by the Council for Scientific and Industrial Research (CSIR) in 2015 showed that several individual systems had been developed to address various aspects of the health system, but there needs to be further development of architecture and an integrated platform to make them interoperable.

Furthermore, the department has implemented a Health Patient Registration System (HPRS) Project as an initial pre-requisite for the development of a patient electronic health record (EHR). The diagnostic, treatment and billing modules needed for an EHR in the context of NHI are yet to be developed. Some of the main challenges identified during the previous eHealth Strategy review include insufficient budget and investments for digital health; cybersecurity; high market-driven costs of broadband connectivity and network infrastructure; inadequate human resource capacity to procure and implement complex eHealth solutions; and poor ICT infrastructure and unavailability of broadband network.

3. LEGISLATIVE MANDATE

In terms of Section 74(1) of the National Health Act, 2003 (Act 61 of 2003), [7] the national Department of Health shall facilitate and coordinate the establishment, implementation and maintenance of the information systems by provincial departments, district health councils, municipalities and the private health sector at national, provincial and local levels in order to create a comprehensive national health information system. Section 74(2) of the Act stipulates that the minister may, for the purpose of creating, maintaining or adapting databases within the national health information system contemplated in subsection (1), 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. Sections 13, 14, 15, 16 and 17 of the Act make a number of key provisions related to patient records. These provisions include the obligation to keep record, confidentiality, access to health records as well as the protection of health records. These provisions apply across all digital health platforms.

ICTs can assist in proactive monitoring of disease incidence and allow patients to report on poor healthcare. Mobile and other communication with patients can increase health awareness among citizens and encourage adherence to health programmes. Plans for achieving this are included in the National Integrated ICT Policy White Paper. [8] South Africa has a substantial legislative foundation in place that can be extended to match digital health's growing requirements. Table 1 reflects the ICT legislation that impacts on digital health.

Table 1: A selection of legislation that has an impact on digital health

Act of Parliament	Purpose
Electronic Communications Security (Pty) Ltd Act, 2002 (Act 68 of 2002)	Privacy and confidentiality of communications
Electronic Communications and Transactions Act, 2002 (Act 25 of 2002)	Privacy and confidentiality of communications
Electronic Communications Act, 2005 (Act 36 of 2005)	Basis for universal connectivity
Protection of Personal Information Act, 2013 (Act 4 of 2013)	Privacy and confidentiality of health records and how they are handled
The National Archives of South Africa Act, 1996 (Act 43 of 1996)	Defines a set of security protocols and retention requirements for any health record, including electronic records

The White Paper for NHI Policy (2017) calls for an integrated and enhanced national health information repository and data (NHIRD) system for the effective management of the NHI. This NHIRD will extract a subset of data from the National EHR. The NHIRD will provide data and analytics needed by the National Health Insurance Fund (NHIF) and will be crucial for the implementation of the NHI and the portability of services for the population.

4. SITUATIONAL ANALYSIS

4.1. National eHealth Strategy 2012-2016 implementation review

The *National eHealth Strategy 2012 - 2016* implementation rapid review was conducted to document the progress made, identify successes, challenges, lessons learnt and make recommendations for the new strategy. The successes achieved included the establishment of the MAC on eHealth, which was expected to advise the Minister on the implementation, monitoring and evaluation of the *National eHealth Strategy, 2016*. Significant progress has been made on the development of digital health foundations in preparation for the NHI implementation. The HPRS project aimed at creating a patient and service provider registration system in preparation for NHI implementation.

The HPRS has developed and implemented an MPI that uses the national identity number as a unique identifier. The HPRS has been developed to provide a patient registry and MPI using the South African identification number and other legal person identification systems such as passports. A notable achievement is the development of the *National Health Normative Standards Framework for Interoperability in eHealth in South Africa (HNSF)*. The CSIR conducted compliance assessments of Primary Health Care (PHC) patient information systems and hospital patient information systems using the framework.

The domains that were assessed included compliance to the health normative standards framework, total cost of ownership, functionality, non-functional features as well as the infrastructure requirements.

The rationalisation of PHC registers for data collection resulted in the reduction of the number of PHC registers from more than fifty registers that were used to six standardised registers. This has significantly improved and standardised data collection as well as lightened the data capturing workload at facility level.

4.2. Current digital health governance

Digital health governance provides for tracking, accountability and steering of the strategy to ensure the health sector meets the expected outcomes. The Minister of Health, after consultation with the National Health Council (NHC) established the MAC on eHealth in terms of Section 91 of the National Health Act, through a Gazette Notice No. 38981 of 10 July 2015. The role of the committee is to advise the Minister on the implementation, monitoring and evaluation of the eHealth Strategy as well as ensure good governance thereof. The committee provides guidance to the path that South Africa should follow to benefit from digital health advancements. Its main focus is on prioritisation, measurable benefits as well as prudent investments on health information systems.

The National Department of Health is required, in terms of Section 74 of the National Health Act, to coordinate the establishment, implementation and maintenance by provincial departments, district health councils, municipalities and the private health sector, of health information systems of the national, provincial and local levels in order to create a comprehensive national health information system. In order to fulfil this obligation, the NHISSA committee was established as a sub-committee of the Technical Advisory Committee (TAC) of the NHC. The NHISSA committee convenes on a quarterly basis and reports to the TAC of the NHC. NHISSA committee membership is comprised of officials responsible for health information; monitoring and evaluation; research; epidemiology; district health systems and primary healthcare; and health sector Planning, in the national and provincial health departments, and representatives of stakeholder organisations.

The NHISSA committee deals with operational issues regarding the implementation of the strategy. Section 75 of the National Health Act mandates the relevant member of the executive council to establish a committee for his or her province to establish, maintain, facilitate and implement the health information systems contemplated in Section 74, at provincial and local level. In this regard, Provincial Health Information Systems Committees have been established in provincial health departments.

4.3. Routine health information systems

In July 2011, the District Health Management Information Systems (DHMIS) Policy [9] for South Africa was adopted. Its aim is to ensure uniformity in the implementation of the DHMIS across the country. Subsequently, the Standard Operating Procedures (SOPs) were developed to guide the implementation of the policy. The main objective of the DHMIS Policy is to strengthen monitoring and evaluation and the use of information in policy and programme planning through the regulation and standardisation of the collection, collation and dissemination of health data.

The DHMIS Policy has guided the provision of a large proportion of the information used for planning, budgeting, health service management, monitoring and evaluation at all levels of the South African healthcare system. The policy has institutionalised the National Indicator Data Set (NIDS) to guide programme development, planning, monitoring and evaluation. The policy, through the DHMIS SOPs has streamlined data management and data flow from facility to national level, progressively reducing the timelines for timely reporting.

The establishment of the District Health Information System (DHIS) in 1996/1997, as a routine system for tracking health service delivery in the public health sector, was a significant development. Over the years, the DHIS has incrementally generated essential data for health service planning; monitoring and reporting. It has served as one of the vital components of the comprehensive Health Management Information System (HMIS), towards which the health sector is working. South Africa has successfully transitioned from DHIS 1.4 to WebDHIS.

4.4. Emergence of mobile health (mHealth) initiatives in South Africa

A number of mHealth initiatives have been implemented to support our priority health programmes. One of those initiatives is the MomConnect programme which was developed by the national Department of Health through a coalition of public and private partners. MomConnect has proven to be useful in educating and encouraging women to take care of themselves and utilise available antenatal and post-natal services during and after pregnancy. More than 2,5 million mothers were registered with MomConnect as at 31 March 2019.

Another significant mHealth application is the Stock Visibility System (SVS) implemented in clinics and hospitals as an electronic stock management system. The system is designed to increase access to accurate, timeous medicine availability information from health facilities. For the new strategy, there is a need to consolidate and rationalise mHealth investments and scale up initiatives with the greatest potential impact. Previously mHealth and eHealth were separate strategies, but they have now been integrated into one digital health strategy.

4.5. Building digital health capacity

Ensuring that there are sufficient, competent digital health workforce capabilities across all disciplines is crucial to the success of the strategy. South African-based universities have started to develop digital health short courses, and supervising Masters and PhD students exploring digital health topics, though these areas remain largely under-developed, with the exception of bioinformatics.

Digital learning, also known as eLearning, offers promise; and early modules have been developed focusing on data quality, DHIS and the NIDS. Guidelines have been developed on eLearning courses and administration of an eLearning hub but there are still a number of challenges that need to be overcome. The National Department of Health has developed the Knowledge Hub, which is a central, electronic interface that promotes easy access to relevant professional development opportunities. The Knowledge Hub is supported by an open-access learner management system and eLibrary, piloted in June 2017.

5. DIGITAL HEALTH VISION

5.1. VISION

South Africa's digital health vision is "Better health for all South Africans enabled by person-centred digital health". Its foundation is the national health vision of "A long and healthy life for all South Africans" [10] and it emphasises digital health's potential to contribute to the health systems transformation and reengineering underway.

5.2. MISSION

To establish an integrated digital health ecosystem of people, processes and technology that support health systems strengthening to enable the efficient service delivery, effective patient care and person empowerment necessary for achieving UHC.

5.3. ARCHITECTURE OF THE STRATEGY

The digital health vision and strategic outcomes provide the anchor points for the strategy. They lead to identifying the strategic principles, components and interventions necessary for success. These are summarised in Figure 2 and described in more detail thereafter.



Figure 2: Components of South Africa's National Digital Health Strategy

6. PRIORITIES FOR DIGITAL HEALTH

The digital health interventions are aligned to the health sector priorities. The strategy will assist the country in dealing with the quadruple burden of disease, quality of care, improving maternal and child health, as well as required health system transformation for NHI. The SDG 3 for health requires countries to measure effective coverage, which goes beyond service delivery to capturing whether treatment is effective and requires good monitoring of patient outcomes, which will require a good patient electronic health record. The digital health priorities for this period will be:

- a. a complete health electronic record, which will improve patient management
- b. the digitisation of health systems business processes. That will include digitisation of various health systems to improve efficiency and quality at an institutional level for human resource, and medicine access
- c. establishing an integrated platform and architecture for the health sector information system, which will ensure interoperability and linkage of existing patient-based information systems
- d. to scale up high impact mHealth for community-based interventions. Within the context of the NHI, it will expand health promotion coverage to vulnerable groups such as children, the elderly, women and others who are prioritised
- e. the development of digital health knowledge workers for successful digital health as well as economic development.

7. STRATEGIC PRINCIPLES

The new strategy is underpinned by five key principles.

7.1. Person-centred focus

A person-centred approach considers all citizens as participants that either require or provide care that is preventative, curative, palliative or a combination at multiple intervals between two major life events, birth and death. Additionally, the individuals and their families are more involved in and able to influence the healthcare required, thus leading to interventions that better meet their unique needs [11]. This includes a paradigm shift in the design of health information systems from patient monitoring for reporting to Case-based Surveillance (CBS). [12] Patient monitoring simply collects aggregated epidemiological and management data, while CBS additionally requires data collection to support clinical decision making and patient education. This helps to serve the increased data requirements presented in the WHO guidelines on person-centred HIV patient monitoring and case-based surveillance. [13]

7.2. Expanded access to services for effective health coverage

Recognising the transformation aspects provides the context for unpacking information requirements and what becomes possible when ICT is used productively, emphasising the part that Digital Health must play in strengthening the health system. Expanding access is a key aspect, focused on providing access to quality health promotion and healthcare services, for effective UHC.

7.3. Innovation for sustainable digital health impact

Innovation is a core aspect of the strategy. Digital health presents opportunities to change the way we do things, increasing automation, adding technologies such as artificial intelligence, introducing efficiencies and creating new opportunities for transforming the way we interact with both our own health decisions, and receiving or providing care within the healthcare system.

7.4. Digital health workforce driving economic development

Successful digital health needs new skills and approaches for existing human resources, as well as new cadres of staff. Success needs two parallel strands. Firstly, hard components, such as skills in ICT sciences, health sciences and workforce management and development. Secondly, soft skills, such as culture, leadership, motivation and change management [14] help to ensure efforts are tailored to local needs and challenges. [15] Entrepreneurship is an additional component needed to promote the progress of the emerging sector and its contribution to economic development.

7.5. A whole-of-government approach

The NDP envisages a single cohesive strategy “to ensure the diffusion of ICTs in all areas of society and the economy”. [16] Reducing the silos between these sectors, aiming to remove fragmentation and duplication, will help government to identify common, reusable ICT building blocks that can be shared to deliver priority SDGs use-cases, and improve the likelihood of achieving digital services at scale with greater return on investments. [17] This is to use digital technologies as levers for development across multiple sectors, sharing infrastructure needed to deliver health, education and agricultural services to increase impact and cost efficiencies.



Strategic interventions are aligned to nine strategic objectives.

Table 2: Nine strategic objectives

Strategic Objectives	
a.	Develop leadership capacity for digital health innovation and adaptive management
b.	Undertake appropriate multi-stakeholder engagement for shared opportunities and successful digital health implementation
c.	Develop sustainable interventions and appropriate investment and funding mechanisms for digital health
d.	Review and strengthen governance structures and oversight mechanisms for strategy implementation
e.	Establish an integrated information architecture for interoperability and effective, safe sharing of health information across health systems and services
f.	Develop appropriate digital applications that improve health services for patients and health workers
g.	Establish a robust physical and network infrastructure and broadband connectivity for priority digital health applications and services
h.	Formulate national legislative, policy and regulatory framework for digital health
i.	Develop enhanced digital health technical capacity and a skilled workforce for digital technology support and implementation

8. STRATEGIC INTERVENTIONS

8.1. Develop leadership capacity for digital health innovation and adaptive management

Achieving effective, collaborative digital health communities, working cooperatively in a sustainable way requires local leadership teams, providing clinical, executive and political leadership for the digital health agenda, in hospitals, clinics, communities and households, and carefully building partnerships to realising the benefits of the strategy.

Table 3: Digital health leadership interventions

Strategic interventions for digital health leadership	
a.	Establish a comprehensive leadership and change management approach, with initiatives to empower digital health champions in facilities, districts, provinces and national as change agents driving transformation, for example through implementation of future digital health leaders programmes.
b.	Introduce a data-driven approach for adaptive leadership through the implementation of business intelligence solutions.
c.	Create local digital health leadership structures at local levels, particularly provincial and district, that ensures active participation by all stakeholders, to lead the way digital health is used to resolve the most pertinent issues faced by patients and health workers.
d.	Establish a network of clinical digital health leaders and champions for the strategy.
e.	Engage political leadership in key departments to harness government-wide development of internet infrastructure and reducing connectivity costs.

8.2. Undertake appropriate multi-stakeholder engagement for shared opportunities and successful digital health implementation

Effective digital health requires collaboration across diverse stakeholder groups. This requires a pro-active programme of activities that will emphasise the critical contribution of numerous stakeholder groups, particularly health workers, patients and a wide range of organisations such as health facilities, districts and provinces, private companies and NGOs and academia. In health information practices, a shift is required from simply collecting data for reporting, to a deeper engagement with the information and the people involved with it, to building collaborative arrangements to extract meaning and find innovative responses. Effective stakeholder engagement is a requirement for success and establishes the key role players and participation for implementation.

Table 4: Digital health stakeholder interventions

Strategic interventions for stakeholders	
a.	Establish effective collaboration mechanisms between public and private sector stakeholders to build cost-effective digital health solutions, reduce data costs and build better ICT infrastructure for digital health.
b.	Create a standard schedule of regular engagement with all stakeholders, particularly users, to get buy in.
c.	Establish a model for co-creation of clinical applications in line with the principles of user experience design.
d.	Participate in global and national digital health dialogues to exploit the fourth industrial revolution for UHC.
e.	Create working groups and establish digital health innovation focal points at universities and parastatals to keep abreast with developments and user challenges.

8.3. Develop sustainable interventions and appropriate investment and funding mechanisms for digital health implementation

There is a need to utilise an appropriate digital health impact appraisal framework to compare various digital health options in order to select the optimal one and then manage its implementations to help secure the envisaged benefits. It should be based on similar work such as the eHealth Impact (eHI) approach, the Digital Health Impact Framework (DHIF) developed by the Asian Development Bank (ADB) and the Digital Health Impact Model for Africa (DHIMA) developed by the African Centre for eHealth Excellence (Acfee). The South African digital health impact appraisal framework will help to secure each initiative's impact on health systems strengthening and South African health.

South Africa will identify the digital health quality measures that drive health quality, and reinforce their position in the digital health Strategy, using guidance from existing models, which include quality perspectives such as better-informed patients, safer healthcare, shorter waiting times, more effective healthcare and modern healthcare. Affordability constraints require that digital health investment choices are based on decision criteria agreed with key stakeholders. These criteria will help to optimise the complex relationships between three components: stakeholders' health expectations, their access to care, and emerging digital health opportunities.

Table 5: Digital health strategy and investment interventions

Interventions for strategy and investment
a. Establish a national grant for digital health implementation in conjunction with National Treasury, to align and coordinate investments, targeting a proportionate allocation of three to five per cent of expenditure on health.
b. Develop a digital health impact model with clear matrices and user-friendly tools to allow decision-makers to assess the probable digital health impact before systems are acquired.
c. Conduct evaluations to ascertain value for money, and promote accountability.
d. Work with National Treasury to identify innovative financing mechanisms for digital health.

8.4. Review and strengthen governance structures and oversight mechanisms for strategy implementation

Plans for a digital health impact model will provide a framework for governance structures to utilise for better oversight over the socio-economic return for digital health initiatives, ensuring that South Africans realise the benefits promised from digital health investments.

Table 6: Digital health governance interventions

Strategic interventions for digital health governance
a. Build a high-level strategy implementation oversight structure with appropriate steering committees to drive the delivery of digital health action plans.
b. Review and align the roles of all current digital health governance structures.
c. Establish a framework for robust reviews to enable decision-making and high level of accountability as far as resources and deployment of systems are concerned.
d. Develop a data governance framework for South Africa.
e. Develop a Systems Governance Policy for making decisions on the life cycles of new and existing systems.

8.5. Establish an integrated information architecture for interoperability and effective, safe sharing of health information across health systems and services

The HNSF provides a substantial architecture and framework for digital health interoperability in South Africa. Work is on-going to expand the framework and extend it into a Health Enterprise Architecture (HEA). These provide a key foundation for developing a common comprehensive framework, incorporating all data sources and information flows, electronic and paper-based, providing a clear development and consolidation path for all components, along a digital development maturity model path. It will provide a common, shared platform for collaboration, and an enabling environment for innovation.

Deployment of a common, shared digital health platform will help to democratise the health information systems development space for more stakeholders to participate. It will include establishing technical resources such as cloud infrastructure and an environment for supporting sophisticated data science activities.



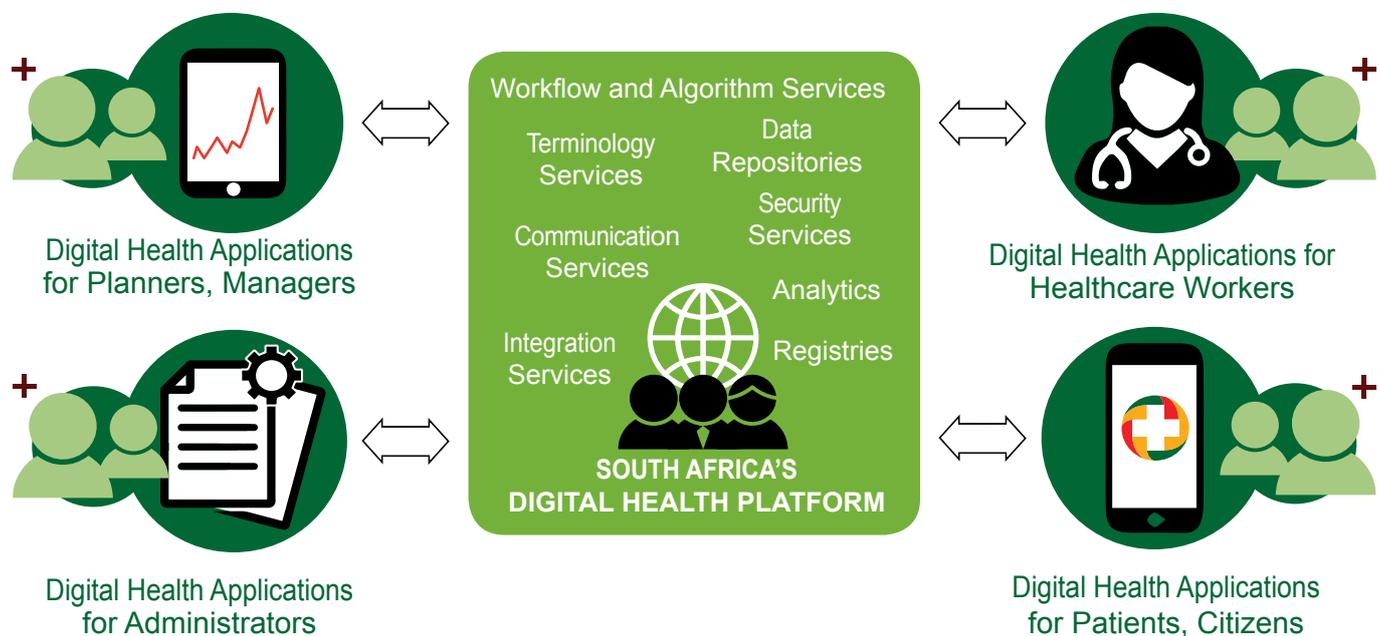


Figure 3: Conceptual overview of South Africa's Digital Health Platform, adapted from the ITU's Digital Health Platform Handbook

This platform will include the creation of reusable frameworks and artefacts that promote success, aligned with principles outlined in the ITU handbook titled Digital Health Platform: Building a Digital Information Infrastructure (Infostructure) for Health. [18] South Africa's Digital Health Platform will help to coordinate and provide technical resources to support digital health activities that achieve:

- overall quality and continuity of care
- adherence to clinical guidelines and best practices
- efficiency and affordability of services and health commodities, by reducing duplication of effort and ensuring effective use of time and resources
- health-financing models and processes
- regulation, oversight, and patient safety resulting from increased availability of performance data and reductions in errors
- health policy-making and resource allocation based on better quality data

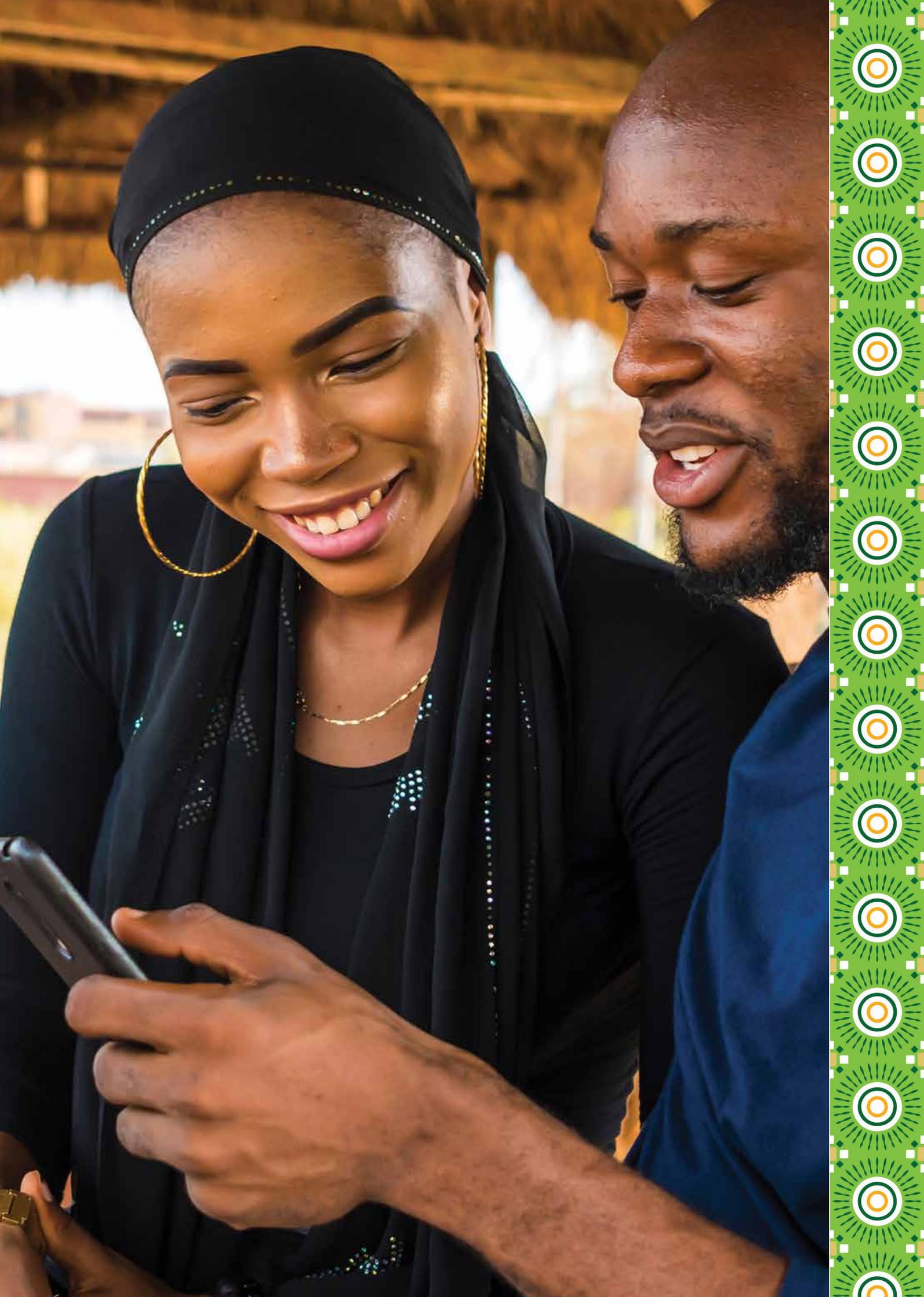
Table 7: Digital health standards and interoperability interventions

Strategic interventions for standards and interoperability	
a.	Establish an open standards and open architecture approach, expanding the HNSF and extending the HEA.
b.	Establish an MPI for all South Africans, leveraging work already accomplished.
c.	Implement HNSF conformance testing as a minimum for all health information systems. Update the HNSF as new standards are developed.
d.	Publish artefacts that allow users to easily adopt and implement standards such as the HNSF and emerging HEA.
e.	Run interoperability hackathons to allow systems' developers to test their systems and demonstrate interoperability.
f.	All patient information systems to implement a unique identifier to facilitate the movement of patients within and across provinces (alignment with national UID).
g.	Conceptualise and implement an integrated digital health platform to promote better collaboration, improve the utility of available solutions, and increase their health system impact.
h.	Establish the South African digital health platform to support digital innovation, promote utilisation of digital solutions for improved health services and to contribute to economic development.
i.	Establish a governance structure to reinforce digital health standards and interoperability.
j.	Align the adoption of global standards with the South African Bureau of Standards (SABS).

8.6. Develop appropriate digital applications and services that improve health services for patients and health workers

Users' experience of systems is a critical factor in the systems' success. More user-centred design approaches are needed that leverage specific methodologies such as UxD, to promote co-design, co-creation and co-ownership of knowledge assets. The existing information systems for patient care and health systems strengthening, including mHealth initiatives, will be centrally coordinated at national and provincial levels, and rationalised for optimal usage.

The information requirements for sustainable health workforce development are well described in the WHO handbook on workforce accounts, [19] including that "Responsible change in any country will rely on the availability, completeness and quality of health workforce data. More specifically, registries are essential to track health workforce capacity and



dynamics, and so is sharing data, indicators and accounts on the health workforce between countries.”

This underpins the need for the HRIS services and applications to be developed, responding to South Africa’s unique workforce development requirements, and guided by international good practice. An HRIS is an opportunity to analyse and coordinate human capital development in the health workforce.

Table 8: Digital health services and applications interventions

Strategic interventions for services and applications	
a.	Establish a roadmap to digitise all health systems business processes across the health service platform, prioritising service enhancing benefits.
b.	Establish a UxD framework for South Africa, with associated good practice recommendations for adoption of co-design, co-creation and co-ownership principles for the development of health systems.
c.	Establish a roadmap for achieving an electronic health record for South Africa, which integrates existing solutions on a common platform, prioritises functionality that will enhance service delivery and continuity of care, while addressing known risks.
d.	Establish data sharing agreements between the national Department of Health and third party information systems to bring data into the national platform, prioritising data from laboratory and pharmacy information systems.
e.	Establish a data science capability to secure technologies such as big data, AI and predictive analytics for enhanced benefits of the digital health ecosystem, particularly more sustainable health systems approaches and evidence-based clinical decisions.
f.	Establish an electronic HRIS that provides the information necessary to support workforce accounts, in turn driving economic growth; this will include an HRH registry and HRH data warehouse, as envisaged by the WHO workforce accounts approach.
g.	Establish a health play store to host approved mobile health apps, prioritising apps for community healthcare.
h.	Establish a conceptual framework for collaborative software development, and mechanisms for adopting and scale-up of tried-and-tested solutions in the health sector.
i.	Establish a South African National Health Observatory, in line with the WHO guidelines.

8.7. Establish a robust physical and network infrastructure and broadband connectivity for priority digital health applications and services

Connectivity is a prerequisite for digital health and many other social developmental initiatives. Connectivity will therefore be addressed as a national imperative, with a definitive, sustainable solution, at scale, across the entire government. Adequate bandwidth provides opportunities for sharing connectivity with employees and clients, via free WiFi and other methods, which will be transformative and support citizens to embrace the opportunities of the fourth industrial revolution.

Table 9: Digital health infrastructure interventions

Strategic interventions for infrastructure	
a.	Establish a health network to provide digital health broadband connectivity, in conjunction with the relevant government departments.
b.	Establish a cloud service for health.
c.	Conduct an HIS baseline assessment across the health sector to determine what infrastructure is available, broken, location (levels of care), functionality and connectivity.

8.8. Formulate national legislative, policy and regulatory framework for digital health

Regulatory strengthening will shape aspects of the digital health landscape that are critical to successful implementation. Two drivers are: to improve and sustain security to respond to increasing challenges; and to develop the digital health market by enhancing the role of the Minister of Health, encouraging effective competition between digital health suppliers, and increasing certainty and market stability for suppliers. The regulatory environment is maturing, with the introduction of laws such as the Protection of Personal Information (POPI) Act, 2013 (Act 4 of 2013).

New businesses are beginning to emerge and there is expanding innovation. Priorities will be to enable decision makers to set clear goals, strategies, priorities and objectives for digital health regulation. Examples are:

- protect patients and citizens using services that rely on digital health
- ensure that the country can expand sustainable digital health interventions successfully and economically for the benefit of patients, citizens and the healthcare system
- clarify links between digital health regulation and the regulation of the healthcare system
- help to strengthen the healthcare system
- ensure effective collaboration with the appropriate institutions and organisations, including other government departments, to enable the implementation of the strategy
- collaborate effectively with other countries.

While digital health regulation is distinct from other regulatory efforts that are critical to healthcare service provision, it will need to interface with those dealing with access, to expand access to healthcare services; quality, to ensure quality of healthcare services; and redress, to deal with specific grievances between patients, citizens and communities against healthcare professionals or health professional organisations. Digital health regulation needs to be consistent with other national and international legislation and regulations related to electronic data.

Table 10: Digital health regulatory interventions

Strategic interventions for regulation: legislation, policy and compliance
<p>a. Establish a body to review the existing regulatory landscape, develop new regulations where appropriate, and create mechanisms to enforce compliance.</p> <p>b. Strengthen regulation on data protection, data sharing between private and public sectors and cybersecurity.</p>

8.9. Develop enhanced digital health technical capacity and a skilled workforce for digital technology support and implementation

Digital health human capital is critical for its implementation. Digital health skills are in demand globally and therefore shortage of these resources are experienced in the public and private sectors in South Africa. Digital health human capital development will address the existing workforce, which will use new tools and approaches, while cultivating new cadres of information health workers. This will be the workforce providing the information needed for evidence-based reporting, planning and action at facility level and above.

Health workforce investment is a driver of economic growth generally across a population. Investments in digital development achieve the same. Investments in digital health therefore need to be constructed effectively to achieve economic growth.

Table 11: Digital health capacity and workforce interventions

Strategic interventions for capacity and workforce
<p>a. Establish a digital health workforce plan, developed in conjunction with all relevant digital health and health workforce stakeholders, that identifies critical technical skills required to drive implementation of the digital health strategy, and establish a comprehensive plan for developing them, utilising diverse learning institutions.</p> <p>b. Establish knowledge worker and information scientist career paths, from basic courses through to undergraduate and postgraduate degrees, clarifying core curriculum components, roles within the health system, and securing appropriate statutory council recognition.</p> <p>c. Establish in-service digital health training for the health workforce, including all disciplines.</p> <p>d. Establish learning exchanges on digital health, both within South Africa and internationally, to share good practice and learn from local and global experience.</p> <p>e. Develop eLearning platforms to make learning materials accessible to health workers.</p>

9. IMPLEMENTATION PLAN

The new strategy will be translated into a detailed implementation plan to deliver the strategic interventions, integrated with the South African government Medium Term Expenditure Framework (MTEF) and annual operational plans. This will be structured to deliver on specific milestones, ensuring good progress and progressively moving towards achieving the ambitious vision of the strategy.

9.1. Digital health user journeys

Strategic interventions must enable digital health users to make progress along their user journeys. A library of user journeys will be described and shared to provide a common anchor point for all digital health interventions in South Africa. Examples of these digital health user journeys are:

- maternal journey
- child health journey
- journey of a person living with HIV
- community health worker journey
- district nurse journey
- medical officer journey
- health asset journey (such as medication)
- personal health seeking journey.



9.2. Managing digital health risks

Since digital health is complex and costly, risk management is a critical aspect of successful implementation. Examples of key risks and their mitigations are provided in Table 12.

Table 12: Examples of important digital health risks and mitigations

Risk	Mitigation
Cybersecurity threats	Establish a cybersecurity policy that will include developing the required leadership and decision structures to build effective threat assessment and mitigation strategies as part of the strategy implementation.
Resistance to change	Get buy-in from critical stakeholders as part of a change management approach.
Insufficient funding to procure digital health solutions	Work with National Treasury to develop investment cases, explore appropriate funding mechanisms and develop the capabilities needed to effectively procure digital health solutions and services for South Africa.

10. RESPONSIBILITY FOR DIGITAL HEALTH

The strategy comes to life in many different levels, both within the health system, and among the stakeholder groups that extend down to citizens. Recognising the responsibilities of individuals and groups is critical to realising digital health's benefits. Key stakeholder groups that will carry accountability for realising the benefits of the strategy include

- a. **National Department of Health**
The national Department of Health must facilitate and coordinate the implementation of the strategy by provincial departments, district health councils and municipalities.
- b. **Provincial health departments**
The provincial health departments must ensure implementation of the strategy by all districts and municipalities within each province.
- c. **Districts**
Every district health council and every municipality that provides a health service must facilitate the implementation of the strategy across all health facilities.
- d. **Facilities**
Each facility manager must implement the SOPs for various digital health systems as part of the implementation of the strategy.

11. MONITORING AND EVALUATION

A detailed Monitoring and Evaluation plan will be developed with clear targets on the activities required to achieve the strategic interventions milestones. The plan will consider the strategies proposed as well as the interventions in the implementation plan. The monitoring aspect will cover the investments, the processes, the activities, outputs and outcomes. The targets will be linked to the business case and the anticipated funding. The evaluation will focus on strategy implementation as well as the effectiveness of key interventions.

12. CONCLUSION

The National Digital Health Strategy for South Africa, 2019 - 2024 provides a unique opportunity to improve the health status of people living in South Africa, creating a healthy, tech-savvy population that embraces existing and new technological innovations, changing how we live, work and innovate as productive global citizens. The strategy creates a shared conversation about how we walk forward together cooperatively, to build on our current early digital health successes, acknowledge and address the substantial obstacles and risks that remain, and build a sustainable digital health ecosystem for further growth and development.

This strategy emphasises the role of every person living in South Africa to be an active, healthy citizen, embracing technology's opportunities while remaining grounded in what makes us unique individuals, caring communities and connected South Africans.

13. ANNEXURE

Table 13: Strategic interventions and timeline targets

Strategic Components	Interventions	Target Period				
		2019/20	2020/21	2021/22	2022/23	2023/24
Leadership	Establish a comprehensive leadership and change management approach, with initiatives to empower digital health champions in facilities, districts, provincial health departments and the national Department of Health as change agents driving transformation, for example through implementation of future digital health leaders programmes.					
	Introduce a data-driven approach for adaptive leadership through the implementation of business intelligence solutions.					
	Create digital health leadership structures at local levels, particularly provincial and district, that ensures active participation by all stakeholders, to lead the way digital health is used to resolve the most pertinent issues faced by patients and health workers.					
	Establish a network of clinical digital health leaders and champions for the strategy.					
	Engage political leadership in key departments to harness government-wide development of internet infrastructure and reducing connectivity costs.					
Meaningful stakeholder engagement	Establish effective collaboration mechanisms between public and private sector stakeholders to build cost-effective digital health solutions, reduce data costs and build better ICT infrastructure for digital health.					
	Create a schedule of regular engagement with all stakeholders, particularly users, to increase participation and sustain these interactions.					
	Establish a model for co-creation of clinical applications in line with the principles of user experience design.					
	Participate in global and national dialogues on digital health within the context of the fourth industrial revolution of achieve UHC.					
	Create working groups and establish digital health innovation focal points at universities.					
Strategy and investment	Establish a national grant for digital health implementation in conjunction with National Treasury, to align and coordinate investments, targeting a proportionate allocation of three to five per cent of expenditure on health.					
	Conduct impact evaluations to promote value for money.					
	Work with National Treasury to identify innovative financing mechanisms for digital health.					

Strategic Components	Interventions	Target Period				
		2019/20	2020/21	2021/22	2022/23	2023/24
Governance	Build high-level strategy implementation oversight structure with appropriate steering committees to drive the delivery of digital action plans.					
	Review and align the roles of all current digital health government structures.					
	Establish a framework for robust reviews to enable decision-making and a high level of accountability from the national Department of Health as far as resources and deployment of systems.					
	Develop a data governance framework for South Africa.					
	Develop a systems governance policy for making decisions on the life cycles of new and existing systems.					
Architecture, standards and interoperability, and unique identifier	Establish an open standards and open architecture approach, expanding the HNSF and extending a HEA.					
	Establish the MPI for all South Africans, leveraging work already accomplished.					
	Implement HNSF conference testing as a minimum requirement for all health information systems. Update the HNSF as new standards are developed.					
	Run interoperability hackathons to allow systems developers to test their systems and demonstrate interoperability.					
	Publish artefacts that will allow users to easily adopt and implement agreed standards, and run interoperability hackathons to allow systems developers to test their systems and demonstrate interoperability.					
	All patient information systems to implement a unique identifier to facilitate the movement of patient within and across provinces (alignment with national UID).					
	Conceptualise the South African digital health platform to promote better collaboration, improve the utility of available solutions, and increase their health systems impact.					
	Establish the South African digital health platform to support digital innovation, promote utilisation of digital solutions for improved health services and to contribute to economic development.					
	Establish a governance structure for health standards.					
	Align the adoption of global standards with the SABS.					

Strategic Components	Interventions	Target Period				
		2019/20	2020/21	2021/22	2022/23	2023/24
Services and applications	Establish a roadmap to digitise all business processes across the health service platform, prioritising service enhancing benefits.					
	Establish a user experience design framework for South Africa, with associated good practice recommendations for adoption of co-design, co-creation and co-ownership principles for the development of health systems.					
	Establish a roadmap for achieving an electronic health record for South Africa, which integrates existing solutions on a common platform, prioritises functionality that will enhance service delivery and continuity of care, while addressing known risks.					
	Establish data sharing agreements between the national Department of Health and third party health information systems to bring data into the national platform, prioritising data from laboratory and pharmacy information systems.					
	Establish a data science capability to source technologies such as big data, artificial intelligence and predictive analytics for enhanced benefits of the digital health ecosystem, particularly more sustainable health systems approaches and evidence-based clinical decisions.					
	Establish an electronic HRIS that provides the information necessary to support workforce accounts, in turn driving economic growth; this will include an HRH registry and HRH data warehouse, as envisioned by the WHO workforce accounts approach.					
	Establish a healthy play store host approved mobile health apps, prioritising apps for community healthcare.					
	Establish a conceptual framework for collaborative software development.					
	Establish a SANHO, in line with the WHO guidelines.					
Infrastructure and connectivity	Establish a health network to provide digital health broadband connectivity, in conjunction with the relevant government departments.					
	Establish a cloud service for health.					
	Conduct a health information system baseline assessment across the health sector to determine what infrastructure is available, broken, location (Levels of care), functionality and connectivity.					
Legislation, policy and compliance	Establish a body to review the existing regulatory landscape, develop new regulations where appropriate, and create mechanisms to enforce compliance, prioritising issues such as data protection and cybersecurity.					

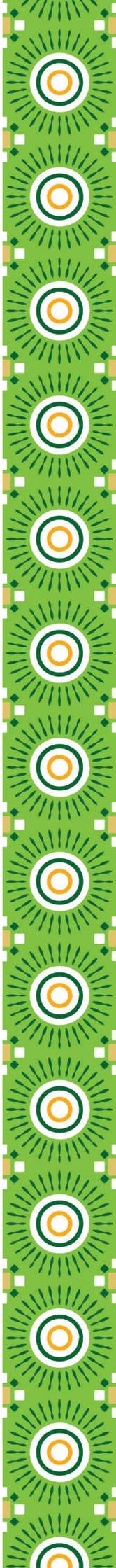
Strategic Components	Interventions	Target Period				
		2019/20	2020/21	2021/22	2022/23	2023/24
Capacity and workforce	Establish a digital health workforce plan, developed in conjunction with all relevant digital health and health workforce stakeholders, that identifies critical technical skills required to drive implementation of the strategy, and establish a comprehensive plan for developing them, utilising diverse learning institutions.					
	Establish knowledge worker and information scientist career paths, from basic courses through to undergraduate and postgraduate degrees, clarifying core curriculum components, roles within the health system, and securing appropriate statutory council recognition.					
	Establish in-service digital health training for health workforce, including all disciplines.					
	Establish learning exchanges on digital health, both within South Africa and internationally, to share good practise and learn from one anothers' experience.					
	Develop eLearning platforms to make learning materials accessible to health workers.					

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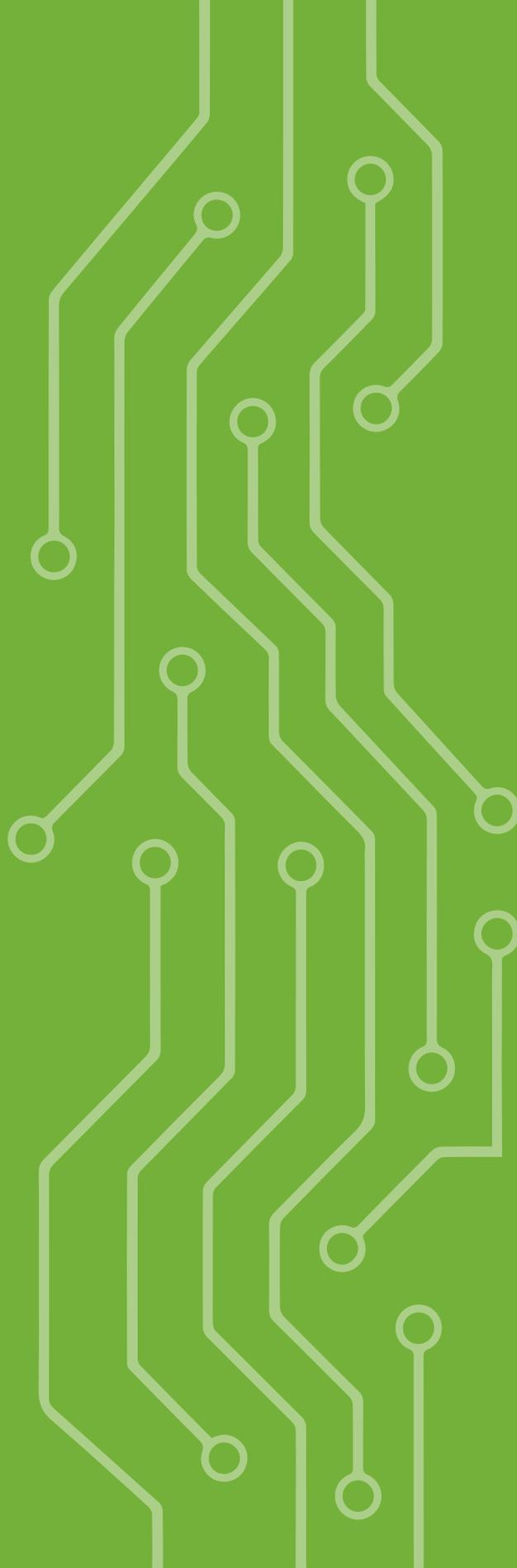
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