REPUBLIC OF NAMIBIA
Ministry of Health & Social Services

NATIONAL eHEALTH STRATEGY 2021-2025

A healthy nation enjoying a high standard of living and quality health and social welfare services enabled by eHealth.

Ministry of Health & Social Services

National eHealth Strategy
2021 – 2025

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December 2020

Foreword

The Ministry of Health and Social Services has the mandate to fulfil one of the aspirations in Namibia's Vision 2030 to "transform Namibia into a healthy and food-secure nation". Namibia strives to provide quality health and social welfare services efficiently and effectively to the population across the country in its quest to achieve universal health coverage. Namibia has identified eHealth as one of its key enablers to achieve universal health coverage.

eHealth is one of the key initiatives in the eGovernment Strategy and is referenced in a number of strategic documents. Indeed, the Fifth National Development Plan (NDP5) highlights eHealth as one of the strategies to achieve the desired outcome that "all Namibians will have access to quality health care by 2022". NDP5 also specifically refers to the synchronisation of the fragmented health systems within the Ministry. Furthermore, the Harambee Prosperity Plan places emphasis on eHealth as one of the means to achieve social progression pillar targets. The plan stipulates that during the Harambee period all health facilities will be electrified and broadband internet connections will be rolled out to 70 percent of health facilities to allow eHealth implementation by 2020. The national aspirations and priorities are in-line with the May 2018 Seventy-First World Health Assembly (WHA) Resolution WHA71.7 that promote Digital health or Health Digitalisation to improve health and well-being for people of all ages, everywhere, toward achieving the Sustainable Development Goals (SGDs).

eHealth utilizes and harnesses the power of Information and Communication Technology (ICT) to provide quality healthcare and social welfare services. The provision of quality health and social welfare services is underpinned by timely, accessible and accurate data to inform decision-making for targeted interventions. Rapid advances in ICT make it possible to keep the finger on the pulse using real-time data to enable among others resource allocation, forecasting, ensuring health security by strengthening disease monitoring and surveillance. It makes health information accessible and available to health workers, patients, clients and stakeholders anywhere and anytime. Namibia is privileged to have high mobile broadband coverage and device penetration; therefore, eHealth enables the same quality of care in urban and rural areas.

I am honoured to present this National eHealth Strategy (2021-2025) that will form the basis for the implementation of eHealth across the country. This Strategy resulted from a comprehensive and consultative process with stakeholders and partners supported by the World Health Organisation (WHO). This Strategy serves as guide and coordination mechanism for the implementation of the eHealth activities within the Ministry of Health and Social Services. The Strategy revolves around seven strategic pillars that focus on leadership and governance; strategy and investment; services and applications; standards and interoperability; infrastructure; legislation, policy and compliance; and workforce. It contains detailed implementation, monitoring and evaluation and costed plans.

Finally, I sincerely believe that eHealth signifies a transformation that can drive productivity whilst enabling us to deliver quality care and services in an efficient and effective manner. This eHealth Strategy therefore came at a time when the country needs eHealth the most.

Dr Kalumbi Shangula (MP)
Minister of Health and Social Services

Preface

This National eHealth Strategy (2021 – 2025) is the response to a national vision of a healthy nation enjoying a high standard of living and quality health and social services enabled by eHealth. It is envisioned that this eHealth Strategy will provide a guide for how Information Communication Technologies (ICTs) will contribute to Namibia's health systems transformation agenda, which is envisioned through a strategy of strengthening health service delivery through utilization of electronic solutions that are adaptive to the priority needs of Namibia.

Various stakeholders and technical teams contributed to the development of this eHealth strategy. The MoHSS acknowledges the collaborative work of numerous individuals and organisations and the specific leadership and guidance provided by the Directorate of Health Information and Research and our partner, the World Health Organisation (WHO).

Appreciation goes to the many individuals who contributed to this process, including Ms Philomena Ochurus, Director of Health Information and Research Directorate, who together with Deputy Director, Mr Joseph Mudjuu and his team, coordinated the development of this strategy.

Special acknowledgement also goes to Dr Charles Sagoe-Moses, WHO Representative in Namibia, Dr Mary Brantuo of WHO Namibia, Dr Hillary Kipruto and Derrick Muneene from WHO AFRO, and WHO consultants Dr Sean Broomhead and Prof Anicia Peters for the provision of technical support in the development of the strategy document.

The Ministry conveys its sincere appreciation to all our stakeholders, in particular the US Centers for Disease Control and Prevention (CDC) Namibia, the University of Namibia (UNAM), Namibia University of Science and Technology (NUST) and United States Agency for International Development (USAID) who contributed to development and finalization of this significant document. All Government Ministries, Agencies and Offices and our partners in the health sector are herewith urged to embrace this eHealth strategic plan and support its implementation as we endeavour to leverage the use of technology towards the achievement of universal health coverage for the Namibia population.

Ben Nangombe
Executive Director: Ministry of Health and Social Services

List of Abbreviations and Acronyms

AIDS	Acquired Immune Deficiency Syndrome
AI	Artificial Intelligence
ART	Antiretroviral Therapy
BYOD	Bring Your Own Device
CBS	Case-based Surveillance
CRAN	Communications Regulatory Authority of Namibia
DHIS	District Health Information System
eHI	eHealth Impact
eHIMA	eHealth Impact Model for Africa
GRN	Government of the Republic of Namibia
HER	Electronic Health Record Master Patient Index MPI
EMR	Electronic Medical Record
FHIR	Fast Healthcare Interoperability Resource
FOSS	Free and Open Source Software
HIM	Health Information Mediator
HIS	Health Information System
HIV	Human Immunodeficiency Virus
HL7	Health Level Seven Internal
HR	Human Resources
HRH	Human Resources for Health
HRIS	Human Resource Information System
ICD-10	International Classification of Diseases 10th revision
ICT	Information and Communications Technology
IHCIMS	Integrated Health Care Information Management System
IHE	Integrating the Healthcare Enterprise
IHSP	Integrated Health Service Plan
IMR	Infant Mortality Rate
IoT	Internet of Things
IT	Information Technology
ITU	International Telecommunication Union
M&E	Monitoring and Evaluation
MICT	Ministry of Information and Communications Technology
MoHSS	Ministry of Health and Social Services

MPI	Master Patient Index
NCRST	Namibia Commission on Research, Science and Technology
NDP	National Development Plan
NGO	Non-governmental organization
PHC	Primary Health Care
SDG	Sustainable Development Goal
SOP	Standard Operating Procedure
TB	Tuberculosis
UHC	Universal Health Coverage
UID	Unique Identifier
WHA	World Health Assembly
WHO	World Health Organization
WHO AFRO	World Health Organization Regional Office for Africa

Table of Contents

List of Tables

List of Figures

Executive Summary

This eHealth Strategy provides a guide for how Information Communication Technologies (ICTs) will contribute to Namibia's health systems transformation agenda. The strategy provides a roadmap towards implementing eHealth. The primary goal of the strategy is to strengthen health service delivery through utilization of electronic solutions that respond to the priority needs of Namibia.

The Strategy is in line with Vision 2030, the e-Government policy, the Fifth National Development Plan and the Harambee Prosperity Plan. In line with WHO's guidance that an eHealth strategy should be based on national health priorities, available and potential resources, and the current eHealth environment, several key stakeholders were engaged and consulted in crafting this strategy.

Namibia's patient medical records are largely paper-based. There are also a number of disparate eHealth systems, some of which are either not functional or vertical/programme based, compromising continuity of care. The cost of healthcare provision is high, exacerbated by the low population density and vast distances between healthcare service providers. The Harambee Prosperity Plan provides for all health facilities to be electrified and broadband connections to be rolled out to 70 percent of health facilities to support eHealth by 2020. Although the Government targets 95% broadband coverage by 2024, the current situation reveals that many rural health facilities have no Internet connectivity and very few have reliable connectivity.

The Ministry of Health and Social Services (MoHSS) had embarked on developing different types of eHealth applications in the past and therefore some essential foundation elements are already in place. Furthermore, other ministries have successfully implemented large-scale systems, such as the Office of the Prime Minister (OPM), Ministry of Finance, and Ministry of Home Affairs, Immigration, Safety and Security. Therefore, strengthening inter-ministerial coordination is a key priority. Local higher education institutions provide capacity strengthening through targeted offerings for health workers and ICT workers.

The eHealth system will not merely change the existing manual medical records system to an electronic one, but also seek to change the way that health-related information is collected, shared, communicated and analysed to improve decision-making and patient care. It should allow healthcare workers to capture, access and share patient information in a timely manner across geographic and health sector boundaries using Information and Communication Technologies that are fit for purpose in a secure and reliable manner. In this way, the eHealth system should improve access to quality care for all Namibians.

Guiding principles for eHealth in Namibia are outlined as: Universal Health Coverage (UHC); user-centric; continuity of care; data security, privacy and confidentiality; non-discrimination and respect for human rights; adherence to global standards on eHealth practices; accountability, transparency and accessibility; affordable and sustainable health services; sustainable partnerships to advance eHealth; and adherence to global standards of data quality.

Strategic objectives are grouped under seven strategic elements: Leadership and Governance; Strategy and Investment; Software services and software applications; Standards and Interoperability; eHealth infrastructure; Legislation, Policy and Compliance; and Workforce.

Appendixes include a strategy implementation plan, Monitoring and Evaluation (M&E) framework, indicative costing estimates, a report on alignment with the WHO Digital Health Strategy, and a report on digital health lessons from COVID-19.

Success factors include eHealth being regarded as a transformational tool for healthcare services; high level commitment; adequate funding for eHealth; a user-centric approach; a well-defined architecture, continuous capacity building both for the ICT personnel and health workforce, and a comprehensive change management strategy.

There is opportunity for eHealth to contribute to long-term local economic development and sustainability through growth of a vibrant local ecosystem of teams and organisations that provide high quality information systems development, maintenance and support services.

1. Strategic Context for eHealth

1.1 Namibian eHealth Development Context

The MoHSS faces increasing demand for services, combined with increasing costs and shortage of skilled healthcare workers. In line with Vision 2030, the e-Government Policy, the fifth National Development Plan (NDP5) and the Harambee Prosperity Plan, the Ministry is implementing an eHealth system in its health facilities to leverage eHealth opportunities to improve efficiencies and health outputs for the people of Namibia.

The Ministry's goal is to ensure that there is positive impact from every interaction between a health system client and a health worker, ensuring that they contribute optimally to health system performance and healthcare outcomes. This will include ensuring that scarce financial and human resources are deployed as effectively as possible.

By developing and implementing this strategy, the Ministry seeks a paradigm shift in the way information is collected, communicated and used across health facilities. This entails moving away from reliance on manual analogue tools such as paper and human memory, to an environment where all the people within the health system access and share health information reliably and securely, in a timely manner, across geographic and health sector boundaries. Such a system provides efficient and effective patient care services to all health seekers.

There are a number of opportunities for the eHealth system to be a transformational tool where the benefits exceed the initial and ongoing investment. The eHealth system can address the challenges of providing health service spanning the entire country by having healthcare workers and patients in both urban and rural areas access the patient's health record anywhere and anytime. The cost of healthcare service provision can be lowered for both the patient and the Ministry through the use of the variety of emerging digital health opportunities such as eHealth, m-Health, telemedicine and social media. eHealth also provides information to both patients and stakeholders in healthcare services to make informed decisions about the individual patients', communities' and the country's health. Thus, the nation can become more informed, healthier and make strides towards achieving UHC.

See further details in Appendix 1: The Strategy in Practice – Current and Future State.

1.1.1 Population Health

Namibia's Vision 2030 aspires to make Namibia a healthy nation in which all preventable diseases are managed and in which people enjoy a high standard of living with access to quality health and other vital services. This is well aligned to the WHO drive for UHC. This means that all people and communities have access to the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose them to financial hardship.

Namibia is a multilingual nation with English as the official language. The country's 825,418km^2 landmass is divided into 14 political regions.

The data for 2016 shows a population size of 2,480,000 with 51.4% for females. Life expectancy at birth is 61 years for males at and 66 years for females.[i] About 36.4% of the total population is younger than 15 years of age and 41.7% of under 15-year olds live in rural areas compared to 30.6% in urban areas. More people aged 60 and above reside in rural areas with 8.3% compared to 4.1% in urban areas. The total literacy rate for the population above 15 years is 88.7% with males at 89.4% and females at 87.9%. The literacy rate for those between 15-34 years is 93.6% with males at 96.4% and females at 97.1%, and urban areas 96.7% compared to rural areas at 90%.[ii]

In 2017, the probability of dying under the age of five was 44 per 1000 live births, while the probability of dying between 15 and 60 years of age per 1000 population was 344 and 253 for males and females respectively.

HIV, TB and malaria are the major diseases in Namibia. Nevertheless, Namibia achieved a 38% decline in new HIV infections between 2010 and 2018 and a 22% decline in AIDS-related deaths. HIV expenditure was at USD$283 000 000 in 2017, of which more than two-thirds was contributed by the Government of Namibia.[iii]

In 2016, approximately 92.9% of all households had access to safe water for drinking with 30.1% having access to piped water inside their dwellings and 33.4% with access to piped water outside their dwellings. Comparing the urban and rural areas, the breakdown is 99.6% / 85% respectively. About 46% of households had no toilet facilities.

The rural population in Namibia remains disadvantaged. It has a higher proportion of people older than 60 and younger than 15 years old, and a lower percentage of the rural population with access to safe water and toilet facilities.

1.1.2 Health System Status

The MoHSS provides healthcare through hospitals, clinics and health centres.[iv] The MoHSS structure comprises 9 national directorates and 14 regional directorates. The national directorates are: Primary Health Care Services; Social Welfare Services; Special Programmes; Finance and Procurement; Health Information and Research; Tertiary Health Care and Clinical Support Services; Policy and Planning; Health Technology and Infrastructure Management; General Management and Atomic Energy and Radiation Protection Authority. MoHSS healthcare provision is complemented by private for-profit hospitals, health centres, private medical practitioners, religious organisations and traditional healers.

Due to the sheer land size of Namibia and its low population density, it is expensive to get services to the people. Therefore, outreach services or mobile clinics serves communities in remote locations.

Health services in Namibia can generally be tied to three components: primary, district health services, (secondary) and tertiary health services. The MoHSS has adopted the primary healthcare approach to delivering health services to Namibians.[v]

About 43.9% of the population receives medical services from clinics and 28.1% from hospitals. In rural areas, the most common medical service providers are clinics (54%) and

health centres (15.1%) respectively, while hospitals 33.7% and private doctors (17.8%) are most common in urban areas.[ii]

Namibia's healthcare is largely funded by the Government of Namibia in fulfilment of its commitment towards achieving UHC as outlined in the National Health Policy Framework 2010–2020. Government revenue, private employers' contributions, and household contributions (as prepayment and other out-of-pocket payments) are the major domestic revenue streams. Donor funding provides an important contribution, especially in combatting diseases such as HIV, TB and malaria.[vi]

Currently, patient information is recorded manually on medical passports and various disparate electronic systems. The electronic systems capture data for various purposes and systems such as HIV data, TB data, stores and financial data, however this data is often captured from paper-based records. There is no single view of the patient for all healthcare providers.

1.1.3 Health Sector Strategic Objectives

The overall outcome of the Health Sector Strategic Objectives is that: "by 2022, all Namibians will have access to quality health systems where the Health Adjusted Life Expectancy (HALE) has increased to 67.5 years from 58 years in 2015".[x] This will be achieved through implementing the following health sector strategic objectives:

- Improve effective prevention and management of communicable diseases
- Improve effective prevention and management of noncommunicable diseases
- Improve Maternal and new-born health
- Improve Emergency Services
- Strengthen social welfare through quality health services
- Integrated and functional ICT infrastructure
- Ensure Regulatory framework for health service delivery
- Accelerate Health infrastructure development
- Improve contracting and pharmaceutical supply of medicines
- Enhance organizational performance
- Enhance human capital development and utilization.

1.1.4 ICT Environment and Mobile Infrastructure

Namibia enjoys 95% mobile broadband coverage with mobile cellular subscriptions in 2018 was at 112.70%.[vii] International Telecommunication Union (ITU) indicators show that in 2017 the percentage of individuals using the internet was at 51%. However, mobile coverage varies between 4G mostly in the urban areas at 36%, 3G (83%) and 2G in remote areas.[viii] Currently, there is a mobile tower expansion project underway with the Ministry of Information & Communication Technology (MICT) and the Mobile Telecommunications Company (MTC) called the MTC081Everyone project to achieve 100% population network coverage.[ix] Existing 2G connectivity is also upgraded to 3G mobile coverage in remote areas.

In 2016, 79.2% of the population aged 15 years and above owned mobile phones of whom a higher proportion (88%) were in urban areas and 69.6% in rural areas. Smart phone ownership was at 39.8% in urban areas versus 11.8% in rural areas while feature phone

ownership was at 12.7% in urban areas and 15.1% in rural areas. Basic phone ownership was at 58.2% and the majority of 73.1% were in rural areas versus 47.5% in urban areas. Facebook made up 33% of all internet traffic in 2018 with Instagram at 16% and secure browsing at 32% (MTC/CRAN). WhatsApp is the most preferred and used instant messaging service at 98% with all other services making up the remaining 2%.[viii]

MoHSS has appointed more ICT personnel with the requisite skills for supporting the system such as analyst programmers and systems administrators. The Ministry has functional videoconference facilities at the Head Office, Windhoek Central, Katutura, Oshakati, Rundu and Katima Mulilo hospitals.[x]

OPM is tasked with providing ICT technical support to all public service entities in terms of human resources, infrastructure and policies. MICT is responsible for the citizen connectivity while CRAN is responsible for telecommunications licences and regulations.

There are various ICT policies currently in place but the ones most relevant for eHealth are: the IT Policy for the Public Service, the Overarching ICT Policy of MICT and the Social Media Policy for Government. The IT Policy for the Public Service makes provision for a Ministerial Information Technology Steering Committee to coordinate and oversee all Government ICT projects, infrastructure and service. The Policy also contains provisions for security and confidentially, integrity and availability of data. Although this does not cover privacy provisions explicitly between patient and health worker, a data protection bill is being drafted while a cyber-crimes bill is awaiting tabling in Parliament.

When one considers mobile broadband subscription at 112.70% compared with fixed broadband subscriptions at 2.53%, and 51% internet users and affordable prepaid airtime bundles,[vii] Namibia has great potential to successfully roll out an eHealth system across the country. Furthermore, such services can be rolled out via mobile platforms, video conferencing facilities can enable eLearning and telemedicine, and social media can be used as health dissemination channel.

1.2 Global eHealth Context

The 71st World Health Assembly (WHA) 2018 recognised the important role that eHealth plays to advance the Sustainable Development Goals (SDGs) and to support health promotion and disease prevention in all countries by improving the accessibility, quality and affordability of health services.[xi] [xii] Converting this potential into probable benefits requires a good strategy and implementation plan.

The National eHealth Strategy aligns with the Seventy-First World Health Assembly (WHA) Resolution (WHA71.7) on Digital Health adopted by the WHO Member States in May 2018. It urges 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 prioritize, as appropriate, the development, evaluation, implementation, scale-up and greater utilization 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".*

In closing the 2018 World Health Assembly, WHO Director General said that everything WHO did going forward would be evaluated in the light of the "triple billion" targets which were approved in WHO's new five-year strategic plan. By 2023 the targets aim to achieve:

- 1 billion more people benefitting from UHC
- 1 billion more people better protected from health emergencies
- 1 billion more people enjoying better health and wellbeing.

As a consequence of implementing this strategy, Namibia will be accelerating its share within the context of the people of Namibia, the attainment of the WHO Triple Billion agenda using eHealth.

1.3 Approach to Developing the Strategy

The eHealth strategy is for the people of Namibia. There is therefore an obligation for active engagement with stakeholders in its development and implementation. Engagement of and consultations with stakeholders was prioritized in the development of this strategy. The consultations included:

- Government Agencies
    - Office of the Prime Minister (OPM)
    - Ministry of Health and Social Services (MoHSS)
    - Ministry of Home Affairs, Immigration, Safety and Security (MHAISS)
    - Ministry of Information and Communication Technology (MICT)
    - Ministry of Defence (MoD)
    - Namibia Institute of Public Administration and Management (NIPAM)
    - Namibia Institute of Pathology (NIP)
    - Namibia Correctional Services (NCS)
- United Nations Agencies
    - World Health Organization (WHO)
    - United Nations Development Programme (UNDP)
    - United Nations Populations Fund (UNFPA)
    - United Nations Programme on HIV and AIDS (UNAIDS)
    - United Nations International Children's Emergency Fund (UNICEF)
- Bilateral/Multilateral organizations
    - International Training and Education Centre for Health Namibia (I-TECH)
    - United States Agency for International Development Namibia (USAID)
    - The USAID Global Health Supply Chain Program Namibia (GHSC)
    - University of California, San Francisco (UCSF)
    - Centres of Disease Control and Prevention Namibia (CDC)
- Institutions of Higher Education
    - Namibia University of Science and Technology (NUST)

- University of Namibia (UNAM).

The framework of engagement was the WHO/ITU National eHealth Strategy Toolkit, which served as a guide for the development of this strategy.

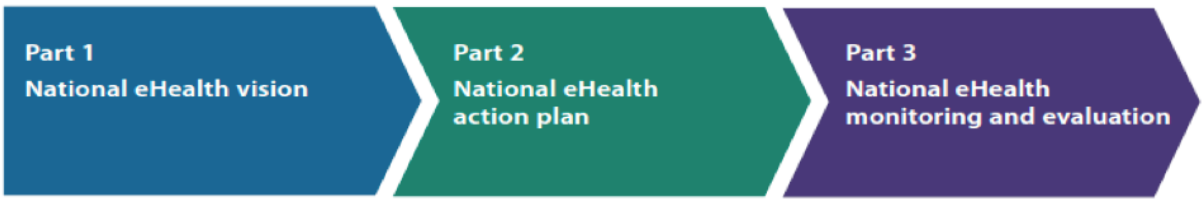

Figure 1: The main parts of the WHO/ITU National eHealth Strategy Toolkit

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".[xiii] The Toolkit starts from the premise that eHealth strategy should be based on national health priorities, the available and potential resources, and the current eHealth environment.

A review of key policy documents that prompted the development of the eHealth Strategy was undertaken. These included the following:

- Vision 2030
- e-Government policy
- NDP5
- Harambee Prosperity Plan
- Principles for Digital Development
- Global Diffusion of eHealth
- Global Observatory for eHealth Services
- WHO/ITU National Digital Health Toolkit
- EHR Manual
- WHO Guideline Recommendations on Digital Interventions for Health System Strengthening released in April 2019.

The objective of the review was to collect and analyse strategic information that would assist the development of the eHealth Strategy, in particular, it assisted in identifying national health priorities.

2. National eHealth Strategic Direction

2.1 Vision

The strategic elements described below define the direction that eHealth will take in Namibia over the next five years. The Vision has a foundation in Namibia's Vision 2030. The national eHealth Vision is:

A healthy nation enjoying a high standard of living and quality health and social services welfare enabled by eHealth.

2.2 Mission

The national eHealth Mission statement is:

To provide the nation with a dynamic eHealth system that supports integrated continuity of care that is accessible, affordable, equitable and is responsive to the needs of the population to improve quality health and social welfare services for better health outcomes in Namibia.

2.3 eHealth System Goals and Outcomes

The primary goal of the strategy is to strengthen health and social welfare service delivery through utilization of electronic solutions that address the needs of the people of Namibia. The goal will be accomplished through the following outcomes, derived from interactions with stakeholders in Namibia:

- All people within the health system accessing and sharing quality health information reliably and securely, in a timely manner, across geographic and health sector boundaries
- Enhanced efficiency and effectiveness in the delivery of healthcare services at central, district, facility and community levels
- Efficient and effective care to all patients
- Scarce financial and human resources are effectively deployed.

2.4 Guiding Principles

Implementation of the National eHealth Strategy will be guided by ten principles that express the manner in which Namibia wishes to proceed. They are aligned with the Principles for Digital Development and are listed in the table below.

Table 1: Guiding principles for eHealth in Namibia

Principle	Description

Principle	Description
1. Universal Health Coverage (UHC)	The strategy should promote UHC meaning that all people and communities can use the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship[xiv]
2. User-centric	Systems emerging from the strategy should be designed with the user in mind; and the use of the system should ensure a better experience of the health system, thereby providing more patient-centric, health worker-centric and citizen-centric services
3. Continuity of care	Systems should support effective continuity of care for all patients, along their care pathways
4. Data Security, Privacy and Confidentiality	All data on patients' health must be kept private and secure
5. Non-discrimination and respect for human rights	The strategy must support upholding fundamental human rights of patients must be respected at all times, improving the health of all persons irrespective of their social and economic status, or any other differentiation
6. Adherence to global standards on eHealth practices	Use global standards, particularly open standards, and open source software wherever possible
7. Accountability, transparency and accessibility	Be data driven, promoting accountability through data use, transparency and ensure accessibility of data and systems to all users
8. Affordable and sustainable health services	eHealth services should provide value for money for Namibia, being affordable, sustainable, and delivering a net benefit over time for all users
9. Sustainable partnerships to advance eHealth	Be collaborative and build solutions that will scale and be sustainable
10. Ensure adherence to global standards of data quality	eHealth services should meet global standards across the different dimensions of data quality such as accuracy, completeness, consistency, timeliness, validity, and uniqueness.

3. Environmental Scanning

3.1 SWOT Analysis

Stakeholder consultations revealed substantial knowledge of strengths and weaknesses of existing eHealth activities, as well as opportunities to move forward, and threats creating risks. These are summarised in the tables below, each aligned to the components of the WHO/ITU National eHealth Strategy Toolkit.

3.1.1 Leadership and Governance

Table 2: Leadership and governance SWOT overview

Strengths • There is support for overall computerization from OPM • There is strong management support for eHealth from MoHSS • MoHSS has an Information Technology Management Division supporting eHealth activities, including key staff • There are technical working groups for HIS and eHealth	**Weaknesses** • There is need to strengthen intersectoral coordination of eHealth activities • The MoHSS has no policy/standard operating procedure (SOP) on leadership and governance on electronic health information systems adaptation, integration, implementation and monitoring compliance. • Limited donor coordination, especially for identification and implementation of eHealth solutions • Limited collaboration among various line Ministries • Limited human resource and technical capacity
Opportunities • Fast-track the validation of the eHealth strategy being developed to meet the demand • Support key eHealth staff at MoHSS with relevant training-skills to manage eHealth projects (project management, programme management and requirements gathering)	**Threats** • Inadequate financial support for key eHealth activities

3.1.2 Strategy and Investment

Table 3: Strategy and investment SWOT overview

Strengths There are ongoing human resource investments at NUST and UNAM in terms of human resources for ICT	**Weaknesses** There is limited budget to support eHealth
Opportunities Investment opportunities with the OPM to support connectivity and system development, management and maintenance Opportunities to leverage universal service funds (taxes from mobile operators) to support eHealth Mobile tower expansion project with the	**Threats** Lack of continuous investment in maintaining and upgrading eHealth infrastructure and workforce

Ministry of ICT and the Mobile Telecommunications Company to provide 100% population coverage and upgrading 2G to 3G connectivity	

3.1.3 Software Services and Software Applications

Table 4: Software services and software applications SWOT overview

Strengths A number of patient level eHealth software systems are in use The Ministry of Defence has undergone a similar exercise regarding development of paperless record systems Availability of baseline needs and system requirements Ministry of Defence has embarked on a similar system using a local public university Public universities have capacity to support the Ministry with patient encounter systems through design, development, research, security and training	**Weaknesses** Current systems are vertical and disease focused Some eHealth systems are deployed without clearance from MoHSS There are limited end user guides for certain systems Current systems are not interoperable and don't cover all patient encounters
Opportunities Extensive eHealth related work has already been undertaken There is a shared desire to develop in-house solutions There is work underway to develop a unique ID for health in Namibia WHO AFRO developing a Digital Health Platform that provides a starting point for country eHealth systems Engage users more in systems conceptualisation and development Use current system requirements documentation to update functionality requirements for new system and systems architecture	**Threats** No roadmap for integration and interoperability of current systems

3.1.4 Standards and Interoperability

Table 5: Standards and interoperability SWOT overview

Strengths There is an interoperability framework with the OPM Data standards are in use including ICD 11 and ICD 10 for mortality coding, HL7, and HL7 FIHR There are imaging systems deployed that support PACS standards in radiology	**Weaknesses** There is limited health data and interoperability implementation Limited awareness on health data and interoperability standards Current approaches do not adequately support the continuum of care
Opportunities The need for standards and interoperability is generally well acknowledged	**Threats** Continuity of care compromised Patient safety concerns that are associated

Fast-track the implementation of the OPM interoperability framework and extend it for health services Develop an MoU with the Ministry of Home Affairs, Immigration, Safety and Security for data exchange	with eHealth systems

3.1.5 eHealth Infrastructure

Table 6: eHealth infrastructure SWOT overview

Strengths 34 Hospitals are interconnected via Multiprotocol Label Switching (MPLS) Established Data Centre There is good mobile coverage of 3G There is technical support from the OPM	**Weaknesses** Current hardware not compatible with workflow, such as desktop computers where the workflow requires mobility eGovernment connectivity not yet in all health facilities Hardware support and monitoring mechanisms need to be strengthened Inadequate specifications for fit for purpose hardware for usage in health Current hardware is mainly Desktop, which limits health worker mobility in facilities, or requires health workers to capture hand-written notes after consultations
Opportunities Make available hardware specifications from OPM Collaborate with the Communications Regulatory Authority of Namibia (CRAN) and Ministry of ICT to get support for last mile connectivity	**Threats** Only intermittent power supply in some remote locations Funding constraints

3.1.6 Legislation, Policy and Compliance

Table 7: Legislation, policy and compliance SWOT overview

Strengths The Overarching ICT Policy of the Ministry of ICT provides government guidelines for ICT There is capacity from academia to support minimum standards for data security The National Planning Commission (NPC) has developed guidelines for the formulation of public policies and strategies. The guidelines have been approved by Cabinet. OPM has already developed administrative IT Policies, Standards and Guidelines for IT Divisions in the Public Service The Ministry of Health and Social Services has a Directorate for Policy Planning responsible for sector specific policies	**Weaknesses** Current regulations are not visibly placed to ensure end user compliance
Opportunities Develop mechanisms to ensure that end users	**Threats** There are no confidentiality and privacy

are aware of the current electronic systems regulations Ensure data security and regulations are part of health worker and ICT training in relevant curricula Activities are underway with MICT in consultation with Ministry of Justice to strengthen legislation on Data Protection and Cyber Crime Namibia has signed the African Union Convention on Cyber Security and Personal Data Protection Namibia has ratified the Malabo Convention on Cyber Security and Data Protection	agreements with non-health staff, such as data clerks, who are accessing data Lack of specialised legal drafters Long process of drafting legislations

3.1.7 Workforce

Table 8: Workforce SWOT overview

Strengths MoHSS has technical staff to support electronic systems, including analyst programmers. There are courses for health worker ICT training and technical ICT worker training with public universities. There is technical support available from public universities. Public universities are working on eHealth education of pre-service personnel, covering both health workers and ICT personnel	**Weaknesses** Current ICT courses address nurses only and need expanded scope Current training opportunities for eHealth are vertical There is need to introduce project management at MoHSS training to support eHealth implementation There is a need to strengthen the analyst programmer requirement gathering skills through training
Opportunities There is general awareness of electronic tools and related applications Ongoing rapid growth in relevant eHealth and Health informatics curricula development at the public universities such as NUST Build communities of practice for end users to support peer learning and best practices, as well as improve end user confidence	**Threats** Community health workers have limited opportunities for ICT basic skills Negative economic climate results in cuts for training opportunities for both health workers and ICT workers

3.1.8 Emerging Opportunities for the Implementation of the eHealth Strategy

There are a number of opportunities for the implementation of the eHealth Strategy as described below. Further details are in

User experience

eHealth is about transforming the user experience, particularly for patients and health workers, so that their experience of the health system changes, care improves, and the health and productivity of all users.

Engaging users in the development of systems is a key opportunity to improve user experience and unlock the potential of eHealth solutions. It will result in better, more

integrated solutions and help to disrupt more traditional methods that have resulted in fragmented, siloed information systems, which do not provide what users need.

Emerging technologies

Technology advances quickly, with new opportunities and innovations presenting themselves. The eHealth Strategy provides priorities to help focus channelling resources to Namibia's most pertinent health needs, and a structure to help govern how these investments are translated into value for Namibia. These advances require a minimum foundation of:

- Digital literacy
- Connectivity
- Alignment to health needs
- Sufficient evidence-base to avoid the risks of using unproven approaches.

Specific emerging technologies that offer potential value, if they can be adequately deployed to serve Namibia's health priorities, include:

- Mobile devices and the emergence of the Internet of Things (IoT)
- Data science disciplines such as advanced analytics, Artificial Intelligence (AI) and Machine Learning (ML)
- Emerging connectivity technologies such as Television whitespace and 5G
- Sensors to populate digital devices with data.

Opportunity of global goods

There are emerging global goods that offer rapid development of eHealth systems to provide a Free and Open Source (FOSS) starting point. WHO AFRO has been developing a similar system using mobile first, FOSS technologies, aligned with current trends. Namibia can use these to grow local capacity.

Opportunity for a local eHealth ecosystem

There is opportunity for eHealth to contribute to long term local economic development and sustainability through the growth of a vibrant local ecosystem of teams and organisations that provide high quality information systems development, maintenance and support services.

This opportunity could be unlocked by investing deliberately to create the foundation for growth and establish the critical mass of expertise necessary to coordinate the development and maintenance of in-house solutions.

There is a need to explicitly describe how local opportunities can be taken as an advantage to fast-track the implementation of the eHealth Strategy in Namibia.

3.2 PESTEL Analysis

A PESTEL analysis provides a different view of similar information. PESTEL analysis is a tool or framework used to understand an environment and macro factors influencing it. Six types of environmental influences are: political, economic, social, technological, environmental and legal. These are inter-dependent with one another. The chart below plots some of the issues driving these factors in the Namibian eHealth environment.

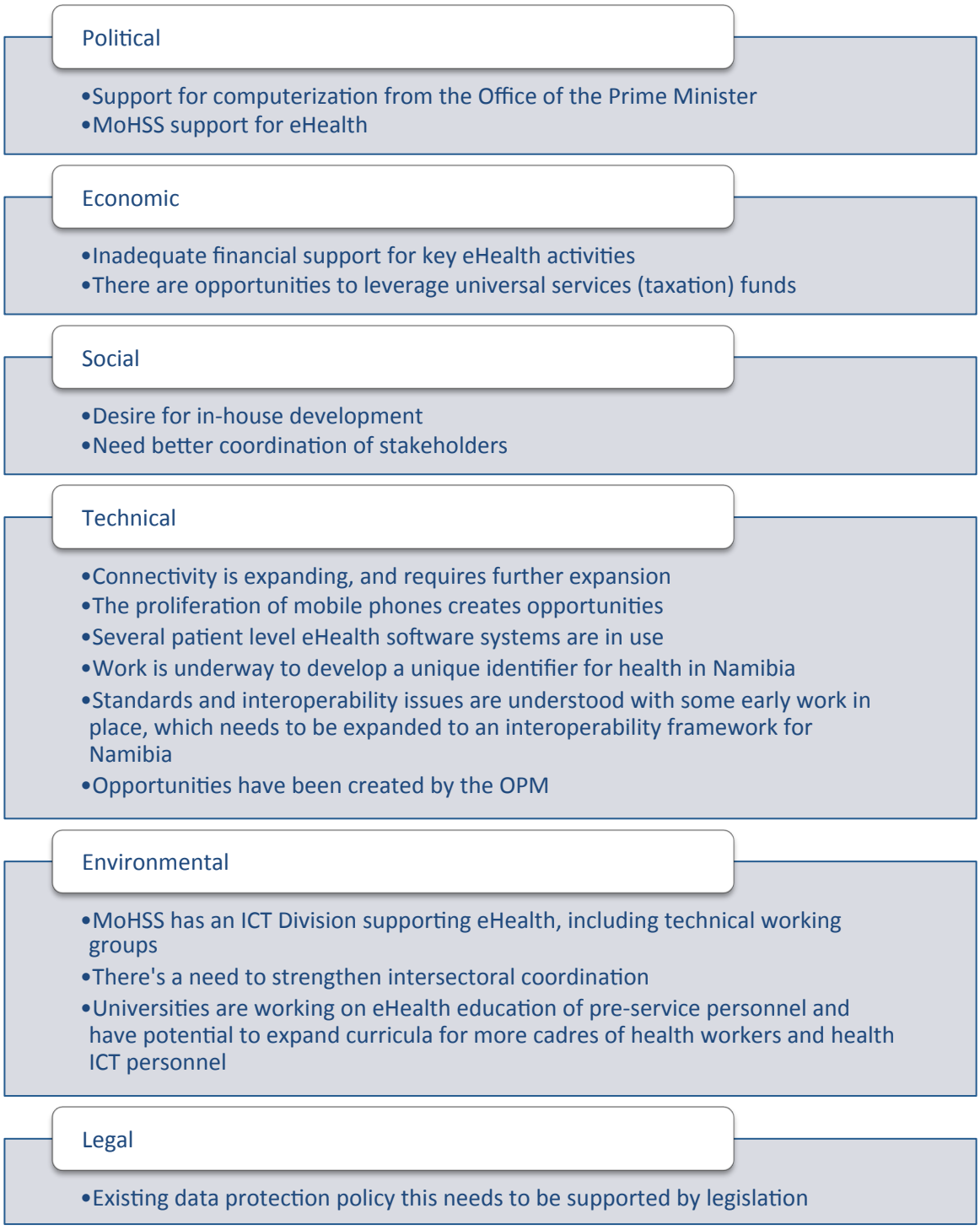

Figure 2: PESTEL analysis of the eHealth environment

4. eHealth Strategy

4.1 Strategic Areas of Focus and Objectives

Strategic objectives and corresponding interventions are divided according to the components of the WHO/ITU National Digital Health Toolkit, which is illustrated in Figure 3 below.

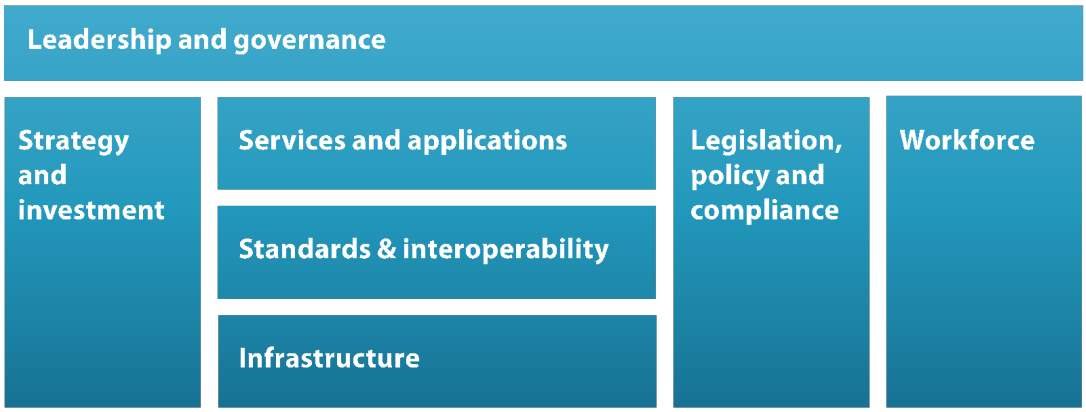

Figure 3: Components of the WHO/ITU National eHealth Strategy Toolkit

4.1.1 Leadership and Governance

One of the key challenges affecting successful implementation of digital health solutions in the Health Sector, is that of weak, uncoordinated and ineffective management frameworks. For the eHealth Strategy to be effectively implemented, it requires dedicated leadership and governance structures at all levels of implementation.

Table 9: Leadership and governance objectives and interventions

Strategic Objective	Strategic Intervention
1. Leadership and coordination of the eHealth Strategy implementation strengthened by end of 2021	- Establish a **National eHealth Steering Committee**, chaired by the MoHSS Executive Director to oversee inter-sectoral coordination for successful implementation of the eHealth strategy - Establish **an eHealth Management Committee (National, Regional)** comprising of MoHSS management - Establish a **National eHealth Projects Office** accountable to the eHealth Steering Committee, staffed by fully seconded officials, to drive the implementation of the strategy, support the Technical Working Groups, and support regional eHealth implementation - Multiple **eHealth implementation teams** from National eHealth Projects Office - Establish strategic partnerships for the implementation of the eHealth strategy
2. Collaborative, integrated workings arrangements	- Develop the eHealth Technical Working Groups (TWGs) required to implement the eHealth plan, such as for Standards

established by 2021	and Interoperability, Regulation, Stakeholder Engagement, Health Information Systems and other - Host an annual stakeholder conference, led by MoHSS, with active support from the National eHealth Steering Committee
3. Manage change effectively from 2022	- Develop an effective, comprehensive change management plan for all the levels of the health system - Implement required change management processes to secure support from all stakeholders
4. Realise net benefits through effective M&E	- Implement an effective M&E framework for the eHealth Strategy - Establish an Independent M&E unit

A proposed structure for the leadership and governance of the eHealth Strategy is as follows:

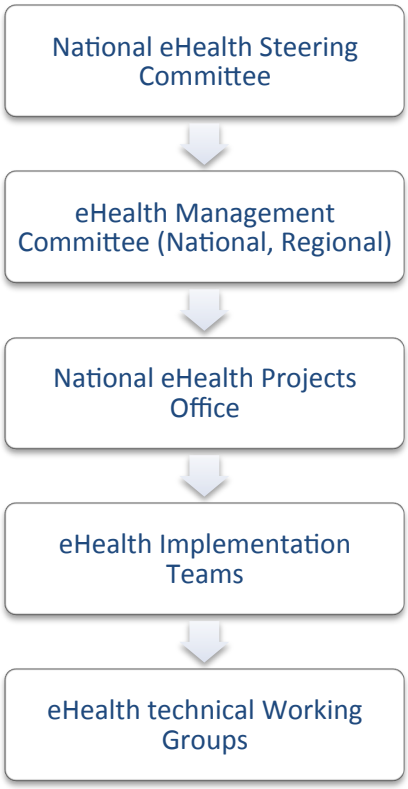

Figure 4: Proposed national eHealth governance structure

4.1.2 Strategy and Investment

eHealth requires adequate and robust investment systems in place, and the components required to develop, operate and sustain the national eHealth environment. Namibia will require clear strategies and investment mechanisms to support effective implementation of the eHealth strategy.

Table 10: Strategy and Investment objectives and interventions

Strategic Objective	Strategic Intervention
1. Identify cost effective solutions and sustainable approaches for implementation of the eHealth strategy attained by 2025	- Establish an **eHealth Impact framework** and use it to ensure that eHealth systems achieve required health system benefits, sustainably - Assess all eHealth systems prospectively, before finances are allocated, to ensure that net benefits are realised
2. Mobilise sustainable long-term resourcing, including providing domestic funding and coordinating international/donor contributions to eHealth strategy implementation by 2025	- Establish the **investment case** to secure government budget for eHealth strategy implementation - Align private sector and donor investment in the eHealth strategy - Establish **a long-term approach for sustainable funding** of eHealth initiatives beyond deployment, to ensure eHealth system sustainability - Establish an **investment committee** to facilitate sound management of eHealth investments - Monitor the investment platform performance - Ensure efficient use of existing resources
3. Create collaborative research environment by 2022.	- Establish an **eHealth research and development agenda** with academic institutions

4.1.3 Software Services and Software Applications

eHealth is about users, who use health information systems productively as part of an integrated and effective health system. eHealth applications must meet these users' needs.

Usability is a critical requirement.

Table 11: Services and applications objectives and interventions

Strategic Objective	Strategic Intervention
1. National eHealth Platform established by 2023	- Identify priority user requirements and relevant applications to address these needs - Establishment of a comprehensive and integrated eHealth management system inclusive of all required applications and m-health apps, such as medical financial administrative, legal compliances, and other aspects - Establish an **in-house electronic Patient Information System** - Establish mechanisms to prevent duplicate notifications. **Unique identification** can be used to address this (for example, by issuing national identities; possibly identification of the parents, or any identifier, such as biometrics). - Principles of single source and single entry - Business process re-engineering
2. Patients' experience of care improved by implementing	- Establish a web-based and/or Apps engagement tool to support implementation of the eHealth Strategy

Strategic Objective	Strategic Intervention
priority applications by 2022	- Keep patients engaged via notifications (SMS or in-app notifications) - Develop a **core suite of modules**, based on priority user requirements, particularly the patient-user and clinical-user, that are all integrated and interoperable

The in-house development will utilise WHO AFRO's Digital Health Platform suite as a starting point, allowing a rapid start-up in key facilities. Thereafter, expansion will take place based on experience gained and performance achieved with this approach. This will be further developed in line with Namibia user requirements.

Where appropriate to integrated systems, the architectural approach described by the International Telecommunications Union (ITU)[xv] will be utilised. It provides an overall architectural approach for integrating eHealth systems.

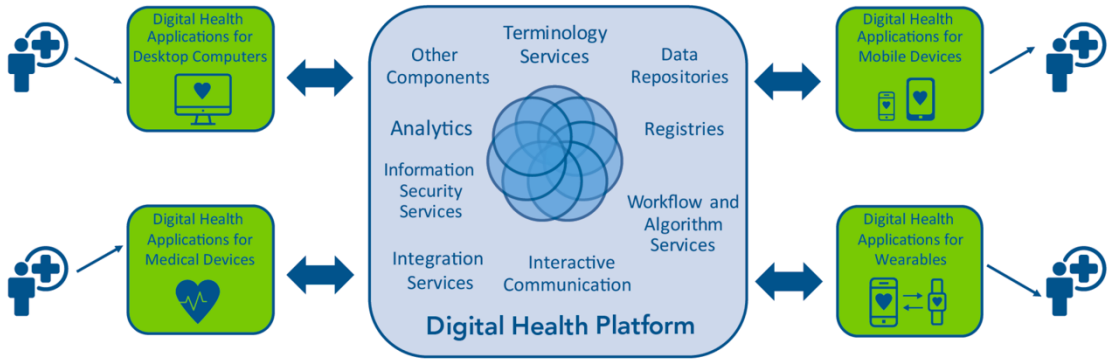

Figure 5: Digital health platform architecture published by the ITU

4.1.4 Standards and Interoperability

Interoperability between different health information systems is a critical requirement for these systems to provide the required holistic view of the health event or programme they describe. It is achieved through several processes, most importantly the agreement of information systems standards. These standards apply to many different parts of information systems and promote the ability for systems to share information and thereby allow users to have integrated views of health data.

An approach to these standards, or standards architectures, needs to be established, and compliance enforced. It can involve following aspects of the health information system:

- Infrastructure
- Connectivity
- Operating systems
- Database management systems
- Applications
- Messaging between information systems
- Systems architectures.

Interoperability can be further supported by establishing an interoperability architecture that simplifies the complexity of interfaces that need to be built between different information systems by creating a mediation layer, often called a Health Information Mediator (HIM). All systems in the environment build one interface to this mediation layer, and the mediation layer manages subsequent sharing of information between multiple individual systems. A unique ID is key to this HIM in order to share patient data between different systems.

Table 12: Standards and interoperability objective and interventions

Strategic Objective	Strategic Intervention
1. Health information availability and sharing strengthened by 2022	- Establish the **Namibia e-Health Standards and Interoperability Framework** which includes the foundations of the Unique Identifier and incorporate international standards such as ICD10, ICD 11 and HL7 which includes FHIR, etc. for data and information exchange. - Design the interoperability platform - Implement the interoperability platform - Publish interoperability artefacts for systems developers to use - Establish electronic **Master Patient Index (MPI)** for use for the health system - Establish **national registries and data dictionaries**

4.1.5 eHealth Infrastructure

Technology infrastructure is a critical requirement for eHealth. It includes a number of aspects and has a close relationship with the eHealth workforce needed to establish, maintain and support the infrastructure. Infrastructure aspects include at least the following:

- Workstations, potentially including a wide range of devices such as desktop PCs, mobile tablets and mobile phones, which may be owned and managed by the MoHSS or may be the personal devices of health workers, officials, ICT workers or patients, known as Bring Your Own Device (BYOD)

- Connectivity infrastructure both between facilities, and often within facilities, to ensure that users have the connection they need to use their applications effectively

- Server hosting infrastructure, which includes the physical machines, as well as the software that needs to be loaded onto those machines, maintained and supported, so that the machines function optimally and securely.

Table 13: Infrastructure strategic objective and interventions

Strategic Objective	Strategic Intervention
All users accessing eHealth tools by end of 2024	- Connect health facilities in the country with the minimum bandwidth required for optimal access to eHealth systems - Establish an **effective and secure operational environment for eHealth infrastructure**, including strengthening the MoHSS physical server hosting

Strategic Objective	Strategic Intervention
	environment - Provide health workers and ICT workers with necessary equipment for accessing information - National eHealth Service Desk hosted in MoHSS

4.1.6 Legislation, Policy and Compliance

For an effective implementation of eHealth strategy, policy and legislative frameworks are essential. Policy and legislation will ensure coordination and collaboration among stakeholders and that compliance of systems is adhered to. It is through legislation and policy that challenges encountered by the country are addressed including coordination of eHealth implementation and compliance to standards.

Legal and regulatory issues are among the most challenging aspects of eHealth: privacy and confidentiality, liability and data-protection all need to be addressed in order to implement eHealth. Rarely does a country have a coherent set of laws specifically designed to address eHealth. Instead, eHealth has to be addressed within the existing or upcoming laws, policies, standards and guidelines on professional liability, data protection etc.

Table 14: Legislation, policy and compliance objective and interventions

Strategic Objective	Strategic Intervention
eHealth regulatory framework strengthened by end of 2023	- Review policies and laws that govern eHealth in the country to produce a gap analysis - Establish a roadmap for addressing the required regulations - Monitor compliance with the policies and laws

4.1.7 Workforce

Successful implementation of the eHealth strategy requires a pool of skilled and competent manpower at all implementation levels. It is therefore critical that a comprehensive eHealth human resource development strategy be developed and implemented to address manpower shortages and technical capacity at central, district, hospital and facility levels.

Table 15: Workforce objectives and interventions

Strategic Objective	Strategic Intervention
Human resource capacity of MoHSS to implement eHealth Strategy strengthened by 2022	- Develop an integrated eHealth Human Capital Development plan for those managing and leading the eHealth Strategy, including aspects of conditions of service and staff retention - Engage with partners/stakeholders to support implementation of the eHealth Human Capital Development (HCD) plan - Implement the eHealth HCD plan for those managing and leading the eHealth Strategy
Build capacity of all end user	- Implement the eHealth Human Capital Development plan for

Strategic Objective	Strategic Intervention
categories (health workers, administrators) to effectively implement the eHealth Strategy by 2022	those managing and leading the eHealth Strategy - Conduct training needs assessment for the workforce - Train staff/end users in the skills required to use eHealth systems - Implement appropriate eHealth solutions that respond to workforce needs - Create online user groups for the workforce as a platform to learn, voice concern and solve problems.
Collaborate with training institutions to produce skilled personnel that will manage the eHealth Strategy by 2022	- Develop an eHealth training curriculum - Integrate ICT skills development in clinical staff training - Seek accreditation for Health Informatics professionals with the Health Professions Councils of Namibia

4.2 Critical Success Factors

A successful eHealth strategy is one that delivers positive benefits for its stakeholders over the period of the Strategy, enabled by ICTs. Critical success factors are listed below.

- The eHealth system should be viewed as a transformational tool to change healthcare delivery and service provision; hence it should be championed by a high-level official such as the Minister.
- Adequate funding for an eHealth ecosystem. Adequate funding for maintaining and upgrading systems beyond systems deployment along with provision for adequately trained health workers and ICT personnel.
- The system should be developed with its users and should be patient-centric, worker-centric and citizen-centric.
- A well-defined eHealth architecture should contain protocols on data standards, interoperability, security, privacy, confidentiality, the necessary laws and policies. Infrastructure should include high-speed internet connectivity between facilities, computing devices and equipment fit for purpose.
- Continuous capacity building of all stakeholders such as patients, health workers and ICT workers.
- A robust Change Management strategy needs to be developed and implemented so that all users become owners of the systems.

For further details, see Appendices:

- Appendix 1: The Strategy in Practice – Current and Future State
- Appendix 2: Strategic Implementation Plan
- Appendix 3: M&E Framework
- Appendix 4: Indicative Costing Estimates
- Appendix 5: Report on Alignment with WHO Digital Health Strategy
- Appendix 6: Report on Digital Health Lessons from COVID-19.

5. Glossary of Terms

eHealth	The WHO definition for eHealth, states that "*eHealth is the use of ICTs for health*".[xvi] The term eHealth is one of many that have been used over the last decade to describe the use of ICT for various types of health systems strengthening. Other names include health informatics, telemedicine, health ICT, mobile health, and most recently, digital health. While there are recognized differences in their meanings, eHealth and digital health are frequently used as synonyms for each other.[xvii]
Digital Health	WHO states "digital technologies can offer limitless possibilities to improve health, from personal fitness to building stronger health systems for entire countries. WHO is determined to harness the positive potential of digital technology to promote and protect the health of all people".[xviii]
Universal Health Coverage	WHO defines Universal Health Coverage as a situation where "all people and communities can use the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship".[xix]
Interoperability	Interoperability in the health ecosystem is "the ability of different information systems, devices and applications ('systems') to access, exchange, integrate and cooperatively use data in a coordinated manner, within and across organizational, regional and national boundaries, to provide timely and seamless portability of information and optimize the health of individuals and populations globally. Health data exchange architectures, application interfaces and standards enable data to be accessed and shared appropriately and securely across the complete spectrum of care, within all applicable settings and with relevant stakeholders, including by the individual".[xx]
Electronic medical record	A real-time patient health record with "access to evidence-based decision support tools that can be used to aid clinicians in decision-making. The EMR can automate and streamline a clinician's workflow, ensuring that all clinical information is communicated. It can also prevent delays in response that result in gaps in care. The EMR can also support the collection of data for uses other than clinical care, such as billing, quality management, outcome reporting, and public health disease surveillance and reporting".[xxi]
Electronic health record	"A longitudinal electronic record of patient health information generated by when delivering services in any healthcare delivery setting. Included in this information are patient

	demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports. The EHR automates and streamlines the clinician's workflow. It has the ability to generate a complete record of the patient encounter, as well as supporting other care-related activities directly via an interface, including evidence-based decision support, quality management, and outcomes reporting".[xxi]
ICD11	The International Classification of Diseases 11th Revision (ICD11) is a global standard for diagnostic health information.
HL7	Health Level Seven International (HL7) provides "a framework (and related standards) for the exchange, integration, sharing, and retrieval of electronic health information. These standards define how information is packaged and communicated from one party to another, setting the language, structure and data types required for seamless integration between systems. HL7 standards support clinical practice and the management, delivery, and evaluation of health services, and are recognized as the most commonly used in the world".[xxii]
FHIR	FHIR stands for Fast Healthcare Interoperability Resource and is a draft data standard developed by HL7 International. "FHIR solutions are built from a set of modular components called "Resources". These resources can easily be assembled into working systems that solve real world clinical and administrative problems at a fraction of the price of existing alternatives. FHIR is suitable for use in a wide variety of contexts".[xxii]
Patient Care	The term "patient care" in this document refers to the holistic approach of patient and/or client within the health and social welfare services domain.

Appendix 1: The Strategy in Practice – Current and Future State

1. The Case for eHealth and Computerised Patient Care

The primary goal of an eHealth system is to increase the efficiency and effectiveness of healthcare delivery and service provision by MoHSS and the country whilst reducing costs by eliminating the duplication of services. Such a system should also ensure the confidentiality, privacy, integrity and security of health data while improving the quality of care and promoting the health and wellbeing of the nation.[xxiii]

This efficiency and effectiveness of an eHealth system is achieved by retaining the link between the patient and the data collected over time and making the data accessible to multiple healthcare providers as required.[xxi] ICTs have great potential to improve health, increase quality and efficiency, and reduce the cost of healthcare and is an enabler for an eHealth system. The healthcare providers should have access anywhere and anytime to a single source of information for a single patient and should be able to update this record in a timely manner at the source of service provided, irrespective whether it is in the field, mobile clinic or bricks-and-mortar health facility.

This electronic data can also be aggregated to provide information about diverse issues such as resource management, monitoring and evaluation, disease surveillance and operational research spanning across communities, regions and countries on which public policy is shaped.[xxiii] Furthermore, it is also useful for disease management such as HIV, TB, diabetes, cardiovascular diseases, maternal and child health services where it can track the individual health problems and treatment over time, giving insights into optimal diagnosis and improving service delivery. With regards to treatment, medicine related issues such as adverse drug reactions can be monitored and captured to avail data on safe use of the medicines in different patient populations. Patient data can also be aggregated to give new insights into trends and insights into health and diseases.

ICTs can also enable the patient to exercise self-care and have access to health information via their mobile phones or social media. ICTs enables the communication between healthcare worker and patient even in the absence of physical or mobile healthcare services.

Consider Nangula's[1] scenario described below to understand the benefits of eHealth.[xiii]

How eHealth would change Nangula's experience

Nangula and her family live in a rural area in Namibia where over 52 per cent of the estimated 2.3 million people live. Nangula has recently been diagnosed with Type 2 diabetes. This happened almost by chance, when she was visiting the nearest health centre with her daughter for a routine

[1] This is a fictitious name and in no way relates to any known person

immunization. During the discussion with the doctor, Nangula reporting feeling frequently tired herself. The doctor requested a blood test, which led to the diagnosis.

Nangula's experience with the current health system

It takes Nangula and her family, including six children over three hours to walk to the health centre, which has a visiting doctor from one of the regional hospitals. Nangula has not met this doctor before and they are unlikely to meet again because the doctor will only be at the clinic for one day and has over 100 patients to see and children to immunize.

While the doctor is administering the childhood immunization to her daughter, Nangula mentions she is more tired than usual. The doctor orders a blood test which shows that Nangula is experiencing the onset of Type 2 diabetes. Nangula's doctor has only one minute to explain to her what Type 2 diabetes is and how to manage her symptoms. There is no paper-based information to give her, and thus she must rely on the doctor and community health worker present to give her the information she needs very quickly.

Walking back to her village from the clinic with her children, Nangula is confused, and does not understand the implications of the diagnosis or how to manage her condition. She has no access to written or electronic information on diabetes (such as information available via the Internet that she could access from her mobile phone).

Nangula is very busy with her family and life goes on. Forgetting about her diagnosis, she does not change her diet or level of exercise or receive further support for her condition. Over time Nangula notices that she is becoming even more tired and is experiencing tingling in the toes of her left foot and blurred vision. She is no longer able to walk the three hours to the health centre, and the complications from her Type 2 diabetes are becoming more serious. She is now at great risk of blindness, heart disease, nerve damage and loss of blood flow to her limbs, as well as kidney disease. This means she that will no longer be able to look after her children adequately and is at risk of premature death.

How eHealth would change Nangula's experience with the health system

With growing mobile phone penetration in the country, Nangula's experience could have been quite different. For example, she has a mobile phone which could have been used to deliver mobile eHealth (or mHealth) services. With the introduction of mHealth, the events that occurred in the above scenario would have been different in the following ways:

∞ **Pre-emptive care**

Education – diet and general health information regarding diabetes could have been delivered to Nangula via her mobile phone, telling her what she should and should not be eating in order to manage her blood sugar levels better.

Helpline – a helpline could enable Nangula to get advice and consult about her diabetes with a health worker or doctor. Nangula could receive dietary counselling to help manage her blood sugar levels, and information on when a medical adviser would be at the nearest health centre if she needed to make an appointment.

Treatment support – a mobile community health worker would visit Nangula's village once a week and provide it with Bluetooth–based blood glucose meters. Nangula could now regularly measure her

blood glucose level and upload this to a diabetes management service via mobile phone. This would enable remote health-care providers to monitor her blood glucose levels and send her an SMS or WhatsApp with health management information. She would also receive a weekly SMS or WhatsApp with updated advice, and information, to help keep her focused and motivated.

∞**Safer care**

With the implementation of Electronic Health Records (EHRs) or summary records Nangula's medical practitioners would now be aware of her diagnosis and help her manage her chronic illness. They would know to check her glucose levels when they meet and to review her treatment options, prescribing medications if necessary.

∞**More efficient use of a care provider's time**

Having access to Nangula's EHR means that the visiting mobile community- based health worker would no longer have to ask Nangula for her health information each time they meet. This record would also be available to other medical professionals that Nangula may interact with either in person or by phone.

In this scenario, Nangula is now much more successful in managing her Type 2 diabetes and in avoiding the serious complications, because there is adequate monitoring of her condition and control of her blood sugar levels. This means that her quality of life and life expectancy will be dramatically improved, and she will be able to continue to work, and care for her family.

Figure 6: An adapted *scenario of* eHealth *assisting in managing patient care*

2. The Current State of eHealth

In Namibia, currently patient records are mostly manually recorded on paper-based medical cards or health passports. The patient carries the medical record to all service providers in the health ecosystem, but if it is lost, forgotten, or full, a new card is issued and all previous medical history is lost. Therefore, multiple medical record cards can exist for a single patient as there is no Unique ID or electronic lookup system in place.

There are fragmented and disparate eHealth systems in place at MoHSS which capture its own data, however often the data is first captured manually and then recaptured on the electronic systems. Although at least one of these silo systems captures the data directly, the data is not shared across platforms and systems.

The first attempt at an eHealth system was made in 2011. USAID Namibia conducted a Health Information System (HIS) assessment in 2012. A number of challenges were identified such as internet connectivity between sites, infrastructure, data management and skills shortage as well as 61 uncoordinated silo systems in operation. A HIS strategy was developed that recommended the establishment of a HIS directorate and an IT Coordination body.

The HIS are still fragmented and disparate, but progress has been made since 2011 when the MoHSS first embarked on implementing an IHCIMS system. MoHSS has made strides in implementing some of the recommendations in the Strategy such as forming a Health Information and Research Directorate and appointing a Director to lead it. MoHSS has

formed an eHealth Steering Committee consisting of the Executive Director, Deputy Executive Director and all Directors within MoHSS as well as a HIS Technical Working Committee consisting of various other ministries and institutions. MoHSS has also strengthened its ICT component by adding an Application Systems Development and Maintenance subdivision and appointing staff for this subdivision.

MoHSS reviewed the 61 disparate systems identified in the HIS assessment in 2012 and still has 13 systems of which 11 are functional, but only eight are owned by MoHSS. The rest are third party service systems like IFMS, Meditech, eBirths and eDeaths. None of the systems are deployed country-wide while the MHAISS systems for eBirths and eDeaths are only accessible at facilities where such births or deaths are recorded.

According to the latest MoHSS Strategic Plan for 2017/2018 – 2021/2022, the PESTEL analysis for the technological section identified the following critical issues:

- Unreliable and outdated technology, such as a system interruption caused by the Human Capital Information Management
- Lack of required technology and equipment, such as MRI machine.
- Technological Skill Deficit
- Poor Maintenance
- Poor/Absence of network coverage in many remote areas.

Currently, some facilities of MoHSS are not connected to each other. However, positive points for MoHSS are the network connectivity being deployed to interconnect the facilities and the country's mobile tower expansion project, MTC081Everyone. The mobile expansion project not only expands mobile connectivity but also upgrades 2G to 3G connectivity in the rural areas in an effort to meet the MICT's mandate of providing 100% population connectivity coverage.

Health workers lack ICT skills to capture and access data electronically and there might be resistance to change from paper-based systems from all stakeholders. These basic ICT skills are essential though to capture data at the point of service and in real-time. The equipment and devices used for capturing the data should also be fit for purpose. For example, field health workers should be able to capture the data via mobile devices such as tablets, laptops or smartphones in the field. Furthermore, health workers should also be trained in disease classification coding, understand and practice patient confidentiality, privacy and system user security requirements.

The MoHSS Strategic Plan for 2017/18 – 2020/21 further shows that the challenge for the legal section in the PESTEL analysis is outdated legislations that are barriers to the provision of health services. This is equally true in terms of cyber laws such as laws dealing with the protection of data and cyber-crimes as the policy gestation stage in Namibia is lengthy and security of data and systems is at risk without redress in the legal system. Namibia has passed the Electronic Transactions Act in 2019 and the Cyber Crimes has been drafted for tabling in Parliament in 2020. The Data Protection bill is still being drafted.

The lack of a functional eHealth system results in Namibia not being able to effectively make evidence-based decisions based on aspects such as individual and aggregate data for disease control, resource management, M&E, and operations management. The patient's longitudinal history is not evident to all healthcare providers over his/her lifespan and therefore it is difficult to provide for adequate interventions.

3. The Future State of eHealth

eHealth using an electronic health record (EHR) can solve many of the current and future challenges. The EHR captures all information contained in the traditional paper-based medical card including the health profile, behavioural and environmental information over time and can be used by all healthcare providers. This EHR is entered and accessed electronically by healthcare providers anywhere, anytime and over the patient's lifespan. All healthcare providers have access to the same information about the patient with the patient's consent. Access rights and privileges can also be imposed on various levels of administrators, medical personnel and entities. Standards for an eHealth architecture, data, interoperability, vocabulary, messaging and security needs to be implemented.

The fact that the patient's EHR is one record connected with a Unique Identifier for the patient, means that it is easier to manage privacy, confidentiality and integrity of the data and enforce access privileges through security protocols. The various data sources making up a sample EHR system is shown in the figure below.

Given Namibia's existing and current expansion projects of mobile internet coverage, smart device ownership, and ongoing upgrading of 2G to 3G networks and 4G networks, this EHR can reduce healthcare provision and monitor costs across the country. The EHR can use m-Health to reach patients in remote areas to enable them and health workers to monitor their progress and provide relevant information for self-care and general wellness. Social Media can be used effectively to disseminate health information but also to monitor trends over time using Big Data and Artificial Intelligence. As information from the individual EHR resides in an integrated system, data can for example be aggregated to model disease outbreaks, possible causes and interventions, hospital beds capacity, pharmaceutical needs, possible adverse medicines reactions, predict each region's healthcare requirements. A simplified view of possible EHR components is provided in Figure 7.[xxiii]

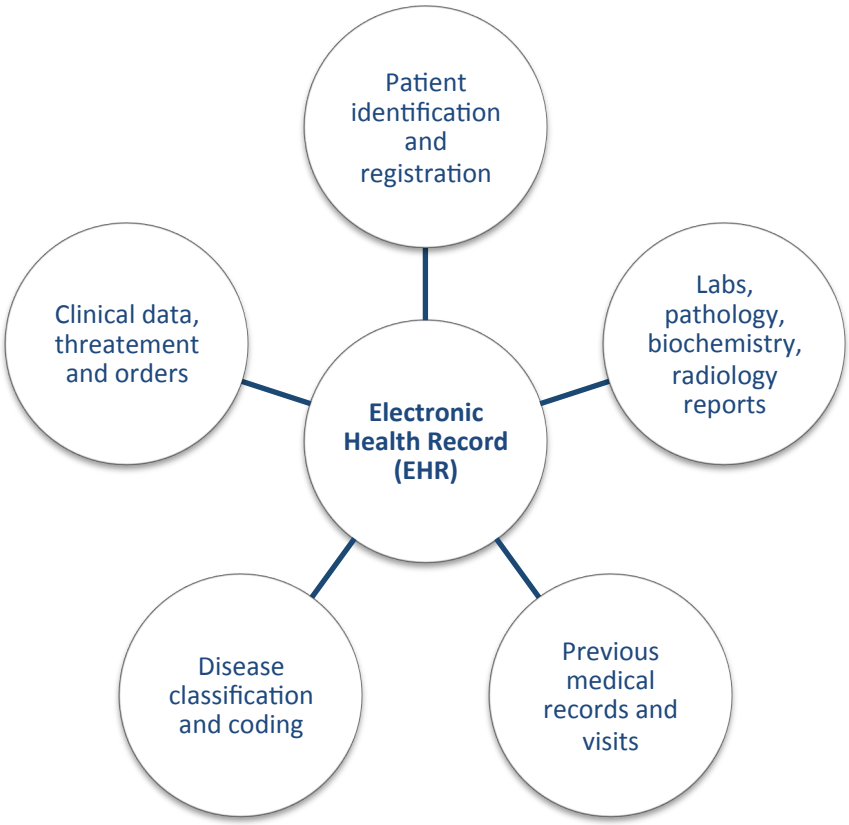

Figure 7: A simplified view of an EHR system

Another important benefit of such a national eHealth system using the EHR is that data from various emerging technologies such as Internet-of-Things and sensors can be automatically captured in the same system and synthesised with global information sources. This information-rich environment can benefit easily from Data Science, Bioinformatics and Artificial Intelligence for healthcare. A further benefit is that data being captured at the source, using mobile devices to populate the EHR, captures the data in real-time in the presence of the patient. The patient can also manage their own health and wellness via mobile apps and health information disseminated via social media platforms.

Such an eHealth system enabling ICT infrastructure can also facilitate eLearning for continuous self-improvement and telemedicine. To realise such a benefit, initially a comprehensive capacity building exercise needs to be conducted initially targeting health workers and ICT workers and then extended to community level for awareness raising and training of the various platforms. The video conferencing facilities at the various regional centres at MoHSS and the local higher education institutions along with local and international expertise can serve the needs for telemedicine and eLearning. The local higher education institutions can provide capacity building and lifelong learning for health workers and ICT workers.

The provision of healthcare service in Namibia is expensive, especially in rural and remote areas given the size of the country and low population density. MoHSS strives to provide for UHC but given the limited resources that emanates predominantly from the government, eHealth services can reduce the cost burden and assist in providing health coverage to rural and remote areas.

The Global Observatory Report for eHealth Series also discusses various studies showing that the benefits of eHealth systems include:

- increased immunisation rates
- improved data collection
- increased staff productivity
- increased service satisfaction
- improved communication
- quality of care
- access to data
- reduced medical errors
- more efficient use of staff time
- improved patient registration
- Improvements in HIV care, paediatric care, radiology, pharmaceutical and laboratory work
- increased adherence to guideline-based care
- enhanced surveillance and monitoring
- fewer medication-related errors such as incorrect prescriptions.

Such an eHealth system can be a transformational tool where the benefits exceed the initial and ongoing investment in the system. Namibia has more challenges in the rural areas with proper housing, sanitation, safe drinking water and bringing healthcare closer to the people. The system can address these challenges by having healthcare workers and patients in the urban as well as the remote and rural areas been able to access the patient's health record anywhere and anytime. The cost of healthcare service provision can be lowered for both the patient and MoHSS through eHealth, m-Health, Telemedicine and social media. The utilisation of eHealth also means that both patients and stakeholders in healthcare services can make informed decisions and take control of the individual patients', communities' and the country's health. Thus, the nation can become more informed and healthier.

Appendix 2: Strategy Implementation Plan

The implementation plan is based on the Strategic Objectives and Strategic Interventions described above. For each intervention, activities have been identified through stakeholder engagements and allocated to years of the strategy.

Table 16: Implementation plan details

Strategic Objective	Intervention	Activity	Deadline	Accountability
SO.1.1: Leadership and coordination of the implementation of the eHealth Strategy strengthened by end of 2021	Establish a National eHealth Steering Committee, chaired by the MoHSS Executive Director to oversee inter-sectoral coordination for successful implementation of the eHealth strategy	Develop and disseminate Terms of Reference (TOR) for the National eHealth Steering Committee, invite applications for membership candidates, and appoint members	2021	Minister of Health and Social Services
		Develop an action plan for eHealth implementation at regional, district and facility levels	2021	National eHealth Steering Committee
		Establish a Secretariat and Conduct regular committee engagements to fulfil the TOR	2021	Executive Director: Ministry of Health and Social Services
		Assign roles, responsibilities to the existing positions within MoHSS and create new positions for the effective implementation of eHealth strategy Develop SOP for the implementation of eHealth strategy	2021	Deputy Executive Director
	Establish an eHealth Management Committee (National, Regional)	Develop and disseminate Terms of Reference (TOR) for the eHealth Management Committee whose membership consists of MoHSS management	2021	Executive Director: Ministry of Health and Social Services
	Establish a National eHealth Projects Office accountable to the eHealth Steering	Establish the TOR, Structure and secure funding for a National	2022	National eHealth Steering Committee

Strategic Objective	Intervention	Activity	Deadline	Accountability
	Committee, staffed by fully seconded officials, to drive the implementation of the strategy, support the Technical Working Groups, and support regional eHealth implementation	eHealth Projects Office		
		Second personnel from MoHSS and other government entities to staff the National eHealth Project Office	2022	National eHealth Steering Committee
	Multiple eHealth implementation teams from National eHealth Projects Office	Define and implement the structure, timelines and operations of the central and regional eHealth Implementation teams	2022	National Project Office
		Appoint/assign the eHealth Implementation teams	2022	National Project Office
	Establish strategic partnerships for the implementation of the eHealth strategy	Develop and publish a Data Governance framework for health information, in coordination with relevant stakeholders	2022	Director: Directorate of Health Information and Research
		Implement a programme on health promotion behaviour	2022	Director: Directorate of Health Information and Research
		Implement a programme of activities to inform and sensitise health professional communities and lead the required changes in behaviour and practices	2022	Director: Directorate of Health Information and Research
		Host an annual eHealth stakeholder conference, supported by National eHealth Steering Committee	2022	National eHealth Steering Committee

Strategic Objective	Intervention	Activity	Deadline	Accountability
SO.1.2: Collaborative, integrated working arrangements established in the MoHSS by end of 2021	Develop the eHealth Technical Working Groups (TWGs) required to implement the eHealth plan, such as for Standards and Interoperability, Regulation, Stakeholder Engagement, Health Information Systems and other	Establish different specialised eHealth Standards Technical Working Groups led by MoHSS	2022	e-Health Steering Committee
		Establish MoUs with key stakeholders such as, Ministry of ICT, Home Affairs, Telecom and others	2022	Executive Director: Ministry of Health and Social Services
		Host an annual eHealth stakeholder conference, supported by National eHealth Steering Committee	2022	National eHealth Steering Committee
SO.1.3: Manage change effectively from 2021	Develop an effective, comprehensive change management plan	Identify the Change Management Champions and develop a comprehensive change management plan	2022	National eHealth Steering Committee
	Implement required change management processes to secure support from all stakeholders	Identify and define the roles of change agents across all Directorates and units in MoHSS to lead the change management and transformation plan	2022	eHealth Steering Committee
SO.1.4: eHealth net benefits secured through effective M&E of the strategy from January 2021	Implement an effective M&E framework for the eHealth Strategy	Present M&E milestones to the National eHealth Steering Committee on a quarterly basis	2021	Deputy Executive Director (initially until 2022)
	Independent M&E unit	Establish an Independent M&E unit to oversee the eHealth Strategy and Implementation plan	2023	National eHealth Steering Committee
SO. 2.1: Identify cost effective solutions and sustainable approaches for implementation of the eHealth strategy attained by 2025	Establish an eHealth Impact framework and use it to ensure that eHealth systems achieve required health system benefits, sustainably	Develop an eHealth Impact framework and define the parameters to make the investment case	2021	eHealth Steering Committee and Investment Committee

Strategic Objective	Intervention	Activity	Deadline	Accountability
	Assess all eHealth systems prospectively, before finances are allocated, to ensure that net benefits are realised	Conduct an impact assessment containing among others the cost-benefit analysis, publish this as reference material and also as a marketing tool	2022	eHealth Steering Committee and Investment Committee
SO. 2.2: Mobilise sustainable long term resourcing, including providing domestic funding and coordinating international/donor contributions to eHealth strategy implementation by 2025	Establish the investment case to secure government budget for eHealth strategy implementation	Establish an investment committee to facilitate sound management of eHealth investments	2021	National eHealth Steering Committee
		Submit an investment case for the eHealth Strategy for National Treasury and NPC to consider addressing through voted funds and donor support	2021	Executive Director: Ministry of Health and Social Services
	Align private sector and donor investment in the e-Health strategy	Develop a standard Business Case template for use by individual initiatives based on the Investment Case modules	2021	Investment Committee / Executive Director: Ministry of Health and Social Services
		Develop expression of interest for public/ private partnership to support the implementation of specific eHealth Strategy business cases	2022	Executive Director: Ministry of Health and Social Services / National Project Office
		Incorporate specific business cases into donor application plans and grant applications	2022	Executive Director: Ministry of Health and Social Services / National Project Office
	Establish a long term approach for sustainable funding of eHealth initiatives beyond deployment, to ensure eHealth system sustainability	Develop a long term plan to maintain, upgrade and improve eHealth systems beyond deployment	2021	Deputy Executive Director

Strategic Objective	Intervention	Activity	Deadline	Accountability
	Monitor the investment platform performance	Submit regular reports on action plans for discussion by the investment committee	2022	Executive Director: Ministry of Health and Social Services / National Project Office
	Monetize eHealth System	% of eHealth maintenance costs recovered	2024	Director: Health Information and Research / National eHealth Steering Committee
SO.2.3: Create a collaboration research environment by 2021	Establish research and development agenda with academic institutions	Develop eHealth research theme and concept note for NCRST and academic institutions to consider	2021	Director: Health Information and Research / National eHealth Steering Committee
SO.3.1: National eHealth Platform established by 2025	Identify priority user requirements and identify relevant applications to address these needs	Conduct a needs assessment, with extensive stakeholder engagement, and publish findings	2021	Director: Directorate of Health Information and Research
		Establish SOPs to guide software application development processes	2021	Director: Directorate of Health Information and Research
		Identify and prioritise critical applications to be developed	2022	Director: Directorate of Health Information and Research
	Establishment of a comprehensive and integrated eHealth management system inclusive of applications of medical financial administrative and legal compliances	Develop and publish an over-arching systems architecture to align systems development activities to the priorities identified in the needs assessment, which will be known as the National eHealth Platform	2021	National eHealth Steering Committee / Director: Directorate of Health Information and Research
		Develop and publish policy guidelines requiring all stakeholders to align development activities	2022	Director: Directorate of Health Information and Research

Strategic Objective	Intervention	Activity	Deadline	Accountability
		to the National eHealth Platform systems architecture		
		Evaluate existing software and establish a roadmap for transitioning them to the National eHealth Platform architecture	2022	Director: Directorate of Health Information and Research
	Establish an in-house electronic Patient Information System	Train key staff in PRINCE2 Project management	2021	Director: Directorate of Health Information and Research
		Develop a Project Charter and establish a roadmap for developing and implementing an in-house electronic Patient Information System	2022	Director: Directorate of Health Information and Research
		Evaluate existing software solutions and establish a roadmap for transitioning them to the electronic Patient Information System roadmap	2022	Director: Directorate of Health Information and Research
		Implement the roadmap to achieve a holistic patient-focused electronic Patient Information System	2022	Director: Directorate of Health Information and Research
		Roll out the electronic Patient Information System to all facilities	2025	Director: Directorate of Health Information and Research
	Establish mechanisms to prevent duplicate notifications. Unique identification can be used to address this (for example, by issuing national identities; possibly identification of the parents, or any identifier e.g. biometrics).	Develop a plan to ensure that all patients can access eHealth services. This includes providing for different methods of patient identification and patient enrolment using multiple methods, such as use of biometrics where no national Identification cards are not available	2022	National e-Health Steering Committee / TWG

Strategic Objective	Intervention	Activity	Deadline	Accountability
	Principles of single source and single entry	Define the policies and SOPs guiding single source and single source entry	2022	National e-Health Steering Committee / TWG
	Business process re-engineering	Develop a comprehensive plan for Business Process Re-engineering prior to eHealth system development	2022	Executive Director: MOHSS / National eHealth Steering Committee
		Examine previous processes and workflows of the current, fragmented eHealth systems and redesigning them to the current needs of the health sector	2022	National e-Health Steering Committee / TWG
SO.3.2: Patients' experience of care improved by implementing priority applications by 2022	Establish a web-based and/or Apps engagement tool to support implementation of the e-Health Strategy	Implement a mobile and/or web-based engagement tool to support the effective collaboration of stakeholders and oversight of the eHealth Strategy and its Strategic Objectives	2022	Director: Directorate of Health Information and Research
		Provide patients with access to key information, such as appointments, through a patient portal	2024	Director: Directorate of Health Information and Research
	Keep patients engaged via notifications, such as SMS or in-app notifications	Notify patients about to key information, such as appointments, general health information, using existing electronic communication channels	2022	Director: Directorate of Health Information and Research
	Develop a core suite of modules, based on priority user requirements, particularly the patient-user and clinical-user, that are all integrated and interoperable	Establish a list of priority Apps and applications to be built and identify critical systems	2022	Director: Directorate of Health Information and Research
		Invite relevant developers to develop the Apps and	2023	Director: Directorate of Health Information

Strategic Objective	Intervention	Activity	Deadline	Accountability
		applications aligned to the National eHealth Platform and national standards and interoperability framework		and Research
SO.4.1: Health information availability and sharing strengthened by 2022	Establish the Namibia e-Health Standards and Interoperability Framework which includes the foundations of the Unique Identifier and incorporate international standards such as ICD10, ICD 11 and HL7 which includes FHIR, etc. for data and information exchange.	Develop and publish a Normative Standards Framework for all information systems, paper based and eHealth initiatives that clearly defines SOPs for implementing new HIS, adapting existing HIS, HIS management and prioritise standards for critical systems	2021	Director: Directorate of Health Information and Research
		Develop a proof of concept for Unique ID approach and develop national Unique Id strategy in line with interoperability strategies	2021	Director: Directorate of Health Information and Research
	Design the interoperability platform	Develop an interoperability architecture for Namibia's eHealth initiatives	2022	Director: Directorate of Health Information and Research
		Design the technical approach to deliver the interoperability architecture	2022	Director: Directorate of Health Information and Research
	Establish registries and national data dictionaries	Establish an electronic national facility register	2021	Director: Directorate of Health Information and Research
		Establish an electronic national data dictionary for the minimum indicator and data set	2021	Director: Directorate of Health Information and Research
		Establish an electronic national health workforce register	2024	Deputy Executive Director

Strategic Objective	Intervention	Activity	Deadline	Accountability
	Implement the interoperability platform	Secure the required human and infrastructure resources needed to build the National eHealth Platform	2022	Executive Director: MOHSS
		Develop key interoperability components of the eHealth Platform, specifically prioritising: the API for HIM, Master Patient index, Master facility list, Data Warehouse, National data dictionary and minimum indicator set, and registries	2023	Director: Directorate of Health Information and Research / National eHealth Steering Committee
		Deploy and maintain the National eHealth Platform	2023	Director: Directorate of Health Information and Research
	Publish interoperability artefacts for systems developers to use	Publish the national interoperability framework	2024	National eHealth Steering Committee
	Establish electronic Master Patient Index (MPI) for use for the health system	Establish electronic Master Patient Index (MPI) for use for the health system	2023	Director: Directorate of Health Information and Research / National eHealth Steering Committee
	Establish registries and national data dictionaries	Establish an electronic national facility register	2023	Director: Directorate of Health Information and Research
		Establish an electronic national data dictionary for the minimum indicator and data set	2021	Director: Directorate of Health Information and Research
		Establish an electronic national health workforce register	2024	Deputy Executive Director

Strategic Objective	Intervention	Activity	Deadline	Accountability
SO.5.1: All users accessing eHealth tools by end of 2024	Connect health facilities in the country with the minimum bandwidth required for optimal access to eHealth systems	Establish a minimum specification for connectivity required by the MOHSS, detailing specifications for different types of facilities, and different types of users	2021	Director: Directorate of Health Information and Research
		Implement a regular update schedule to update this specification according to new applications emerging in the Namibian eHealth environment, including WIFI access for patients	2022	Director: Directorate of Health Information and Research
		Continued dialogue with the telecommunications authorities to support mobile and the case for eHealth expansion for the last mile and leveraging universal services funds		Director: Directorate of Health Information and Research
		Complete the rollout of national connectivity to support the minimum connectivity specification	2022	Executive Director: MoHSS
	Establish an effective and secure operational environment for e-Health infrastructure, including strengthening the MoHSS physical server hosting environment	Identify the most appropriate server hosting approach to meet the needs of National services and applications, and interoperability platform	2021	Director: Directorate of Health Information and Research
		Develop a master configuration plan for the server infrastructure approach identified	2021	Director: Directorate of Health Information and Research
		Procure the appropriate infrastructure and/or services for the server infrastructure approach identified	2022	Director: Directorate of Health Information and Research

Strategic Objective	Intervention	Activity	Deadline	Accountability
		Establish SOPs for all key systems administration processes, including user management, server management, instance management, and security	2022	Director: Directorate of Health Information and Research
		Develop policy document for all systems administration processes, aligned to the eHealth Strategy	2022	Director: Directorate of Health Information and Research
		Train all relevant stakeholders on SOPs	2023	Director: Directorate of Health Information and Research
		Initiate a regular internal audit cycle of all SOPs	2023	Deputy Executive Director
	Provide health workers and ICT workers with necessary equipment for accessing information	Develop a minimum specification for user devices fit for purpose for health workers, ICT workers	2021	Director: Directorate of Health Information and Research
		Develop a plan for bringing devices up to the minimum specification	2021	Director: Directorate of Health Information and Research
		Develop a policy on BYOD for health workers, ICT workers, patients	2021	Director: Directorate of Health Information and Research
		Develop a pro-active maintenance and replacement plan for all devices, including a plan for supply of consumables, where appropriate	2022	Director: Directorate of Health Information and Research
	Establish registries and national data dictionaries	Establish an electronic national facility register	2021	Director: Directorate of Health Information and Research
		Establish an electronic national data dictionary	2021	Director: Directorate of

Strategic Objective	Intervention	Activity	Deadline	Accountability
		for the minimum indicator and data set		Health Information and Research
		Establish an electronic national health workforce register	2024	Deputy Executive Director?
	National eHealth Service Desk hosted in MoHSS	Establish a National eHealth Service Desk hosted in MoHSS	2024	National Project Office
SO.6.1: eHealth regulatory framework strengthened by end of 2024	Review policies and laws that govern eHealth in the country to produce a gap analysis	Review eHealth strategy and identify priority regulatory aspects	2021	Director: Directorate of Health Information and Research
		Identify appropriate regulatory process for each priority regulatory aspect (Policy and/or Guideline and/or Legislation)	2021	Director: Directorate of Health Information and Research
		Draft regulatory documents in consultation with stakeholders	2022	Director: Directorate of Health Information and Research
	Establish a roadmap for addressing the required regulations	Establish a roadmap to address the gaps identified with legislation, policies, SOPs, guidelines	2024	Deputy Executive Director
		Publish regulations after processing through appropriate channels	2024	Deputy Executive Director
		Publish specific policy and regulations on cybersecurity, data protection and local "home-grow" solution development	2024	Deputy Executive Director: MoHSS, OPM and Ministry of ICT
	Monitor compliance with the policies and laws	Conduct regulatory compliance testing on priority aspects, across all implementers in Namibia	2024	Director: Directorate of Health Information and Research
SO.7.1: Human resource capacity of MoHSS to implement	Develop an integrated eHealth Human Capital Development	Engage with MOHSS management and stakeholders to identify	2021	HIRD

Strategic Objective	Intervention	Activity	Deadline	Accountability
eHealth Strategy strengthened by 2022	plan for those managing and leading the eHealth Strategy, including aspects of conditions of service and staff retention	capacity development requirements and opportunities for the workforces		
		Develop and publish a comprehensive human resources development plan for eHealth	2022	Director: Directorate of Health Information and Research
	Engage with partners/stakeholders to support implementation of the eHealth Human Capital Development (HCD) plan	Consultations with partners/stakeholders to develop eHealth training strategies	2021	Director: Directorate of Health Information and Research
		Implementation of the workforce strengthening plan	2022	Directorate Human Resources
		Include the establishment of an eHealth Leadership Development programme	2022	Director: Directorate of Health Information and Research
	Implement the eHealth HCD plan for those managing and leading the eHealth Strategy	Engage with implementation stakeholders to identify requirements and opportunities to support a workforce strengthening plan	2021	Director: Directorate of Health Information and Research
		Create incentives for local ICT organisations to recruit and retain local ICT professionals to contribute to systems development and maintenance for the eHealth Strategy	2023	Executive Director: MOHSS
SO.7.2: Build capacity of all end user categories (health workers, administrators) to effectively implement the eHealth Strategy by 2023	Implement the eHealth Human Capital Development plan for those managing and leading the eHealth Strategy	Manage effective implementation of the implementation workforce strengthening plan	2023	HR Director/ Director: Directorate of Health Information and Research
		Improve human resource management system to encourage problem solving regarding use of eHealth solutions	2023	HR Director/ Director: Directorate of Health Information and Research

Strategic Objective	Intervention	Activity	Deadline	Accountability
		Develop eHealth skills retention policy in consultation with stakeholders	2023	HR Director/ Director: Directorate of Health Information and Research
	Conduct training needs assessment for the workforce	Conduct training needs assessment for the workforce	2022	HR Director/ Director: Directorate of Health Information and Research
	Train staff/end users in the skills required to use eHealth systems	Partner with local higher education institutions and NIPAM to conduct staff training (health workers and ICT workers)	2022	Director: Directorate of Health Information and Research / National eHealth Steering Committee
		Offer basic ICT training to existing health workers through a local institution	2022	National eHealth Steering Committee
		Implement on-job training and e-Learning for currently employed workforce, especially for application/system specific training	2023	HR Director/ Director: Directorate of Health Information and Research
		Conduct Training-of-Trainers for nursing and medical training staff on eHealth strategy and ICT	2022	HR Director/ Director: Directorate of Health Information and Research
	Implement appropriate eHealth solutions that respond to workforce needs	Conduct training needs analysis for the existing workforce	2022	HR Director/ Director: Directorate of Health Information and Research
		Create user groups for the workforce as a platform to learn, voice their concerns and solve problems	2022	HR Director/ Director: Directorate of Health Information and Research
S.O. 7.3: Collaborate with training institutions to produce skilled personnel who	Develop eHealth training curricula for different ICT workers	Collaborate with institutions of higher learning and other stakeholders to develop	2021	National eHealth Steering Committee/

Strategic Objective	Intervention	Activity	Deadline	Accountability
will manage the eHealth Strategy by 2025	and health workers	and/or adapt appropriate training programs		
		Develop modularised eHealth training curricula for health workers and ICT workers separately	2022	National eHealth Steering committee / Director: Directorate of Health Information and Research
		Partner with local Higher Education Institutions (HEIs) to develop the Health Informatics curriculum	2021	Director: Directorate of Health Information and Research /Local HEIs
	Integrate ICT skills development in clinical staff training	Integrate ICT skills development in clinical staff training	2022	Director: Directorate of Health Information and Research
	Seek accreditation for Health Informatics professionals with the Health Professions Councils of Namibia (HPCNA)	Enter into a dialogue with the Health Professions Councils of Namibian about accreditation	2022	Director: Directorate of Health Information and Research
		Submit the proposed modularised eHealth training curricula for various type of workers for approval by HPCNA and NQA	2024	Director: Directorate of Health Information and Research

Appendix 3: Monitoring and Evaluation Framework

Effective implementation of the eHealth Strategy requires a Monitoring and Evaluation (M&E) framework. The M&E framework deals with each of the strategic components of the strategy, outcome indicators which will be used to determine the performance level of achieving each Strategic Objective, and both baseline and targets for each intervention. The data source is also listed.

The M&E framework will guide the MoHSS in identifying the most valuable and efficient use of resources, while at the same time guiding strategic information required for the implementation of the eHealth Strategy. The M&E framework will help to improve performance and achieve the anticipated results for each Strategic Pillar, Strategic Objective and Interventions. The M&E framework will also improve current and future performance and management of outputs, outcomes and impact.

Table 17: M&E framework

Strategic Objective	**Intervention**	**Outcome indicator**	**Means of Verification**	**Target**				
				'21	**'22**	**'23**	**'24**	**'25**
SO.1.1: Leadership and coordination of the implementation of the eHealth Strategy strengthened by end of 2021	Establish a National eHealth Steering Committee, chaired by the MoHSS Executive Director and might include MoHSS Directors among its members to oversee inter-sectoral coordination for successful implementation of the eHealth strategy	Terms of Reference (TOR) for the National eHealth Steering Committee exist and members appointed	National eHealth Steering Committee TOR and organogram	1	1	1	1	1
		Action Plan for eHealth implementation at regional, district and facility levels developed.	eHealth Action Plan	1	1	1	1	1
		Secretariat established and regular committee engagements fulfilled (Quarterly)	Minutes of secretariat meeting	2	4	4	4	4
		Roles and responsibilities assigned to the existing positions within MoHSS and new positions created for eHealth strategy	SOP and Job descriptions	1	1	1	1	1

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
		SOP for the implementation of eHealth strategy developed	SOP	1	1	1	1	1
	Establish an eHealth Management Committee (National, Regional)	Terms of Reference (TOR) for the eHealth Management Committee whose membership consist of MoHSS management (created)	eHealth Management Committee TOR and organogram	1	1	1	1	1
	Establish a National eHealth Projects Office accountable to the eHealth Steering Committee, staffed by fully seconded officials, to drive the implementation of the strategy, support the Technical Working Groups, and support regional eHealth implementation	TOR and structure established; funding secured for a National eHealth Projects Office	Project Office TOR, Organogram and Budget	0	1	1	1	1
		Personnel seconded from MoHSS and other government entities to staff the National eHealth Project Office	Project Office organogram	0	1	1	1	1
	Multiple eHealth implementation teams from National eHealth Projects Office	The structure, timelines and operations of the central and regional eHealth Implementation teams established	Action Plan document	0	1	1	1	1
		eHealth Implementation teams assigned	HR records Teams in place	0	1	1	1	1
	Establish strategic partnerships for the implementation of the eHealth strategy	Proportion of signed Key Stakeholders MoUs	MOUs Signed	0	10	50	100	100
		A Data Governance framework for health information,	Data Governance Framework document in	0	Yes	Yes	Yes	Yes

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
		established and published	place (Yes/No)					
		A programme on health promotion behaviour developed	Electronic and print media ads, brochures. Health promotion programme in place	0	Yes	Yes	Yes	Yes
		A programme of activities to inform and sensitise health professional communities and lead the required changes in behaviour and practices implemented	Activity plan in Place	No	Yes	Yes	Yes	Yes
		An annual eHealth stakeholder conference hosted	Conference programme and report	0	1	1	1	1
SO.1.2: Collaborative, integrated working arrangements established in the MoHSS by end of 2022	Develop the eHealth Technical Working Groups (TWGs) required to implement the eHealth plan, such as for Standards and Interoperability, Regulation, Stakeholder Engagement, Health Information Systems and other	Establish specialised eHealth Standards Technical Working Groups led by MoHSS established	Quarterly TWG meeting minutes	0	2	4	4	4
		Proportion of TWG Terms of Reference adopted (%)	TORs adopted	0	50	100	100	100
SO.1.3: Manage change effectively from 2022	Develop an effective, comprehensive change management plan	Change Management Champions identified and a comprehensive change management plan developed	Change management plan	0	1	1	1	1
	Implement required change management processes to secure support from all	Roles of change agents across all Directorates and units in MoHSS to	List of Change management agents	0	1	1	1	1

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
	stakeholders	lead the change management and transformation plan identified and assigned						
SO.1.4: eHealth net benefits secured through effective M&E of the strategy from January 2022	Implement an effective M&E framework for the eHealth Strategy	M&E framework implemented	eHealth Annual progress report	0	1	1	1	1
		Independent M&E unit established	M&E TOR and M&E unit with staff in place	0	1	1	1	1
SO. 2.1: Identify cost effective solutions and sustainable approaches for implementation of the eHealth strategy attained by 2025	Establish an eHealth Impact framework and use it to ensure that eHealth systems achieve required health system benefits, sustainably	An eHealth Impact framework established	eHealth Impact framework	0	1	1	1	1
	Assess all eHealth systems prospectively, before finances are allocated, to ensure that net benefits are realised	An impact assessment published	Impact Assessment report	0	0	1	1	1
SO. 2.2. Mobilise sustainable long term resourcing, including providing domestic funding and coordinating international/donor contributions to eHealth strategy implementation by 2025	Establish the investment case to secure government budget for eHealth strategy implementation	An eHealth investment committee established		0	1	1	1	1
		An investment case for the eHealth Strategy for National Treasury and NPC to consider addressing through voted funds and donor support submitted	eHealth Investment case	0	1	1	1	1
	Align private sector and donor investment in the e-	Standard Business Case template completed	MoHSS Annual Plan	0	1	1	1	1

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
	Health strategy	Expression of interest for PPPs developed implementation of specific eHealth Strategy business cases	PPPs engagement framework	0	1	1	1	1
		Number of concluded PPPs in eHealth	MoHSS Annual Plan	0	3	3	3	3
		Specific business cases for donor application plans and grant applications developed	Grant applications list	0	1	1	1	1
	Establish a long term approach for sustainable funding of eHealth initiatives beyond deployment, to ensure eHealth system sustainability	A long-term plan to maintain, upgrade and improve eHealth systems beyond deployment developed	Project Management Plan / MoHSS Annual Plan	0	1	1	1	1
	Monitor the investment platform performance	Number of investment committee meetings	Investment Committee reports	1	4	4	4	4
SO 2.3 Create a collaborative research by 2022.	Establish an eHealth research and development agenda with academic institutions.	Proportion of Research & development agenda items funded (%)	MoHSS Annual Plan	0	25	50	75	100
SO.3.1: National eHealth Platform established by 2025	Identify priority user requirements and identify relevant applications to address these needs	Proportion of priority application identified and relevant applications implemented and operational by 2020	OPM/MoHSS/ WHO	0	85	100	100	100
SO.3.1: National	Identify priority user requirements	Needs assessment, with extensive	Needs assessment	0	1	1	1	1

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
eHealth Platform established by 2025	and identify relevant applications to address these needs	stakeholder engagement, with published findings	report					
		SOPs to guide software application development processes developed	Software application development SOP	0	1	1	1	1
		Identify and prioritise critical applications to be developed	Applications priority schedule	0	1	1	1	1
	Establishment of a comprehensive and integrated eHealth management system inclusive of applications of medical financial administrative and legal compliances	National eHealth Platform alignment framework developed	National eHealth Platform alignment document	0	0	1	1	1
		Policy guidelines published for alignment of activities to the National eHealth Platform systems architecture	Policy on systems alignment	0	0	1	1	1
		National eHealth Platform architecture roadmap developed	National eHealth Platform document	0	0	0	1	1
	Establish an in-house electronic Patient Information System	Proportion of key staff trained in PRINCE2 Project management (%)	Training report	0	20	90	90	90
		A Project Charter developed and a roadmap established for developing and implementing an in-house electronic Patient Information System	Electronic patient information system development document	1	1	1	1	1

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
		Existing software solutions evaluated and roadmap established for transitioning them to the electronic Patient Information System roadmap	Report on software solutions transitioning Plan	0	0	1	1	1
		Roadmap implemented to achieve a holistic patient-focused electronic Patient Information System	HIRD Strategic plan	1	1	1	1	1
		Proportion of health facilities implementing Electronic Patient Information System rolled out to all facilities (%)	Action plan / MoHSS Annual Plan	5	40	60	80	100
	Establish mechanisms to prevent duplicate notifications. Unique identification can be used to address this (for example, by issuing national identities; possibly identification of the parents, or any identifier e.g. biometrics).	Unique identifier developed and implemented	HIRD Strategic plan / MoHSS Annual Plan	No	Yes	Yes	Yes	Yes
	Principles of single source and single entry	The policies guiding single source and single source entry defined	Single source and single source entry Policy	0	0	1	1	1
	Business process re-engineering	A comprehensive plan for Business Process Re-engineering prior	BPR Plan	1	1	1	1	1

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
		to eHealth system development is developed						
S.O. 3.2: Patients' experience of care improved by implementing priority applications by 2022	Establish a web-based and/or Apps engagement tool to support implementation of the e-Health Strategy	Proportion of Mobile/Web-based engagement tool established and implemented (%)	Logs of number of registered and active users using the tool	0	10	40	80	100
	Keep patients engaged via notifications (e.g. SMS or in-app notifications)	Notifications sent from the system	System Notification report	No	No	Yes	Yes	Yes
	Develop a core suite of apps, based on priority user requirements, particularly the patient-user and clinical-user, that are all integrated and interoperable	Proportion of user-friendly patient apps based on priority user requirements developed (%)	OPM/MoHSS/ WHO	0	100	100	100	100
S.O.4.1: Health information availability and sharing strengthened by 2022	Establish a National standards and interoperability framework, including the foundations of the unique identifier, and incorporate international standards like ICD11, ICD10 and HL7, which includes FHIR, etc. for data and information exchange, aligned with the national interoperability framework	Interoperability Standards framework developed and published.	The Namibia e-Health Standards and Interoperability Framework document	0	Yes	Yes	Yes	Yes
		Unique ID proof of concept developed National Unique Id strategy in line with interoperability strategies developed	1) Unique Identifier Concept Report 2) National Unique Identifier Interoperability Strategy Document	0	Yes	Yes	Yes	Yes
	Design the interoperability platform	Interoperability architecture for Namibia's eHealth initiatives	The Namibia e-Health Interoperability Architecture Reference	No	Yes	Yes	Yes	Yes

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
		developed	Document					
		Technical approach to deliver the interoperability architecture developed	Interoperability architecture Implementation plan	No	Yes	Yes	Yes	Yes
		Identify core systems for interoperability and information exchange	Core Systems Interoperability Document	Yes	Yes	Yes	Yes	Yes
	Implement the interoperability platform	Proportion of the required human and infrastructure resources needed to build the National eHealth Platform secured (%)	HIRD Quarterly Report	20	45	65	100	100
		Proportion of priority interoperability components developed for eHealth Platform (%) Priority components include: API for HIM, Master Patient Index, Master Facility List, Patient Level Data Warehouse, National Data Dictionary and Minimum Indicator Set, and registries.	HIRD Quarterly Report	0%	30	70	90	100
		Proportion of sites implementing interoperability platform (%)	HIRD Quarterly Report	0	30	60	80	100
	Publish interoperability artefacts for systems	The national interoperability framework	HIRD Quarterly Report	No	No	Yes	Yes	Yes

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
	developers to use	published						
	Establish electronic Master Patient Index (MPI) for use for the health system	Electronic Master Patient Index (MPI) for use for the health system established	The Namibia e-Health Interoperability Architecture Reference Document	No	No	Yes	Yes	Yes
	Establish registries and national data dictionaries	Registries and national data dictionaries established	HIRD Quarterly Report	No	No	Yes	Yes	Yes
S.O.5.1: All users accessing eHealth tools by end of 2024	Connect health facilities in the country with the minimum bandwidth required for optimal access to eHealth systems	A minimum specification for connectivity set	HIRD Strategic plan	No	Yes	Yes	Yes	Yes
		A regular update schedule to update this specification according to new applications emerging in the Namibian eHealth environment, including WIFI access for patients established	HIRD Strategic plan	No	Yes	Yes	Yes	Yes
		Engagement framework with the telecommunications authorities to support mobile and the case for eHealth expansion for the last mile and leveraging universal services funds developed	Engagement framework	Yes	Yes	Yes	Yes	Yes
		Proportion of sites linked to national connectivity to support the minimum connectivity specification (%)	MoHSS Annual Report	10	40	60	80	100
	Establish an effective and secure	Hosting of National services	HIRD Strategic	Yes	Yes	Yes	Yes	Yes

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
	operational environment for e-Health infrastructure, including strengthening the MoHSS physical server hosting environment	and applications, and interoperability platform in place	plan					
		Master configuration plan for the server infrastructure in place	HIRD Strategic plan	No	Yes	Yes	Yes	Yes
		Proportion of sites with appropriate infrastructure procured (%)	HIRD Strategic plan	5	30	80	100	100
		SOPs established for all key systems administration processes, including user management, server management, instance management, and security	HIRD Strategic plan / SOPs	No	Yes	Yes	Yes	Yes
		Policy document developed for all systems administration processes, aligned to the eHealth Strategy	Policy	No	Yes	Yes	Yes	Yes
		Proportion of relevant stakeholders trained on SOPs (%)	Training report	10	40	70	100	100
		A regular internal audit cycle of all SOPs established	Internal Audit schedule	No	Yes	Yes	Yes	Yes
	Provide health workers and ICT workers with necessary equipment for accessing	A minimum specification for user devices fit for purpose (health workers, ICT workers)	HIRD Strategic plan	No	Yes	Yes	Yes	Yes

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
	information	developed						
		A plan for bringing devices up to the minimum specification developed	HIRD Strategic plan	No	Yes	Yes	Yes	Yes
		A policy on BYOD (health workers, ICT workers, patients) developed	BYOD Policy	No	Yes	Yes	Yes	Yes
		A pro-active maintenance and replacement plan for all devices, including a plan for supply of consumables, where appropriate, developed	Device Maintenance policy	Yes	Yes	Yes	Yes	Yes
	Establish registries and national data	An electronic national facility register established	HIRD Strategic plan	Yes	Yes	Yes	Yes	Yes
		An electronic national data dictionary for the minimum indicator and data set established	HIRD Strategic plan	Yes	Yes	Yes	Yes	Yes
		An electronic national health workforce register established	HIRD Strategic plan	Yes	Yes	Yes	Yes	Yes
	National eHealth Service Desk hosted in MoHSS	A National eHealth Service Desk hosted in MoHSS established	Service Desk exists / HIRD Strategic plan	No	Yes	Yes	Yes	Yes
SO.6.1: eHealth regulatory framework	Review policies and laws that govern eHealth in the country to produce a	eHealth strategy and priority regulatory aspects identified	Policy Review Report	No	No	Yes	Yes	Yes

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
strengthened by end of 2024	gap analysis	The appropriate regulatory process for each priority regulatory aspect instrument identified (Policy and/or Guideline and/or Legislation) completed	Analysis report legal instrument identified for review	No	No	Yes	Yes	Yes
		Draft regulatory documents (Policy and/or Guideline and/or Legislation) in consultation with stakeholders existing	eHealth Steering Committee Progress report	No	Yes	Yes	Yes	Yes
	Establish a roadmap for addressing the required regulations	A roadmap to address the gaps identified with legislation, policies, SOPs, guidelines established	eHealth Steering Committee progress reports /Roadmap	No	Yes	Yes	Yes	Yes
		Regulations published after processing through appropriate channels	Number of regulatory documents published	No	No	Yes	Yes	Yes
		Specific policy and regulations on cybersecurity, data protection and supporting local "home-grown" solution development published	Number of specific policy and regulations on cybersecurity and data protection published	No	Yes	Yes	Yes	Yes
	Monitor compliance with the policies and laws	Number of audit and compliance assessment on priority aspects across all implementers in Namibia completed	Audit Reports	1	2	2	2	2
SO.7.1: Build	Develop an	Capacity	eHealth	No	Yes	Yes	Yes	Yes

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
capacity of MoHSS to implementation team strengthened by 2021	integrated eHealth Human Capital Development plan for those managing and leading the eHealth Strategy, including aspects of conditions of service and staff retention	development requirements Plan developed	Steering Committee reports					
		Comprehensive human resources development plan for eHealth developed and published	HCD Plan	No	Yes	Yes	Yes	Yes
SO.7.2 Human resource capacity of MoHSS to implement eHealth strategy strengthened by 2022	Implement the eHealth HCD plan for those managing and leading the eHealth Strategy	Workforce strengthening plan and implementation framework in place	eHealth Steering Committee report / MOHSS Annual Plan	No	Yes	Yes	Yes	Yes
		Human resource management system to encourage problem solving implemented	eHealth Steering Committee report / MOHSS Annual Plan	No	Yes	Yes	Yes	Yes
		eHealth skills retention policy developed	Retention policy	No	Yes	Yes	Yes	Yes
	Train staff/end users in the skills required to use eHealth systems	Partner framework with local higher education institutions and Nipam to conduct staff training (health workers and ICT workers) developed	Signed MOUs	No	Yes	Yes	Yes	Yes
		Proportion of health workers empowered with basic ICT training to existing through a local institution (%)	Training reports	20	60	80	90	100
		Implementation of on-job training and e-Learning framework for currently employed	Training reports	No	Yes	Yes	Yes	Yes

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
		workforce, especially for application and system specific training						
		Training-of-Trainers for nursing and medical training staff on eHealth strategy and ICT conducted	Number of trainees	TBD				
	Appropriate eHealth solutions that respond to workforce needs implemented	Training needs analysis for the existing workforce conducted	Training needs analysis report	No	Yes	Yes	Yes	Yes
		user groups for the workforce platform for learning, voicing their concerns and solve problems developed	Platform in place	No	Yes	Yes	Yes	Yes
SO. 7.3: Collaborate with training institutions to produce skilled personnel who will manage the eHealth Strategy by 2025	Develop eHealth training curricula for different ICT workers and health workers	Collaborate framework with institutions of higher learning and other stakeholders to develop and/or adapt appropriate training programs developed	MOUs / Agreements / Curriculum documents	No	Yes	Yes	Yes	Yes
		Develop modularised eHealth training curricula for health workers and ICT workers separately	Curricula	No	Yes	Yes	Yes	Yes
		Partnership framework with local Higher Education Institutions (HEIs) to develop the Health Informatics	Curriculum	No	Yes	Yes	Yes	Yes

Strategic Objective	Intervention	Outcome indicator	Means of Verification	Target				
				'21	'22	'23	'24	'25
		curriculum						
	Integrate ICT skills development in clinical staff training	Integrated ICT skills development in clinical staff training	Curriculum	No	Yes	Yes	Yes	Yes
	Seek accreditation for Health Informatics professionals with the Namibian Health Profession Council	Engagement framework on accreditation with Namibian Health Profession Council developed	Engagement framework	No	Yes	Yes	Yes	Yes
		modularised eHealth training curricula for various type of workers submitted for approval by NAHPC and NQA	Curriculum / NQA / NAHPC	No	Yes	Yes	Yes	Yes

Appendix 4: Indicative Costing Estimates

A draft indicative costing profile of Namibia's National eHealth Strategy shows the annual spending trajectory in the figure below.

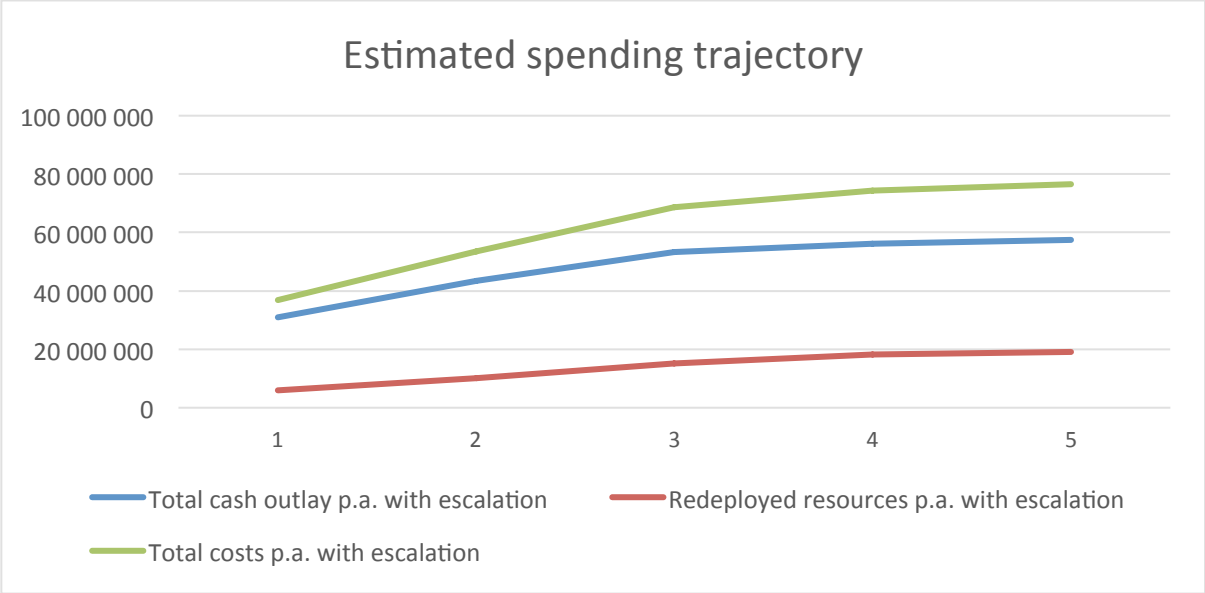

Figure 8: National eHealth Strategy estimated spending trajectory

Total estimated costs over the five years are approximately N$354m. This represents 2.36% of the total health spend in Namibia (estimated at N$15bn per annum). Extra financial requirements of over N$276m are 78% of the total costs is anticipated and redeployed resources are estimated at about 22% (about N$78m) of the total.

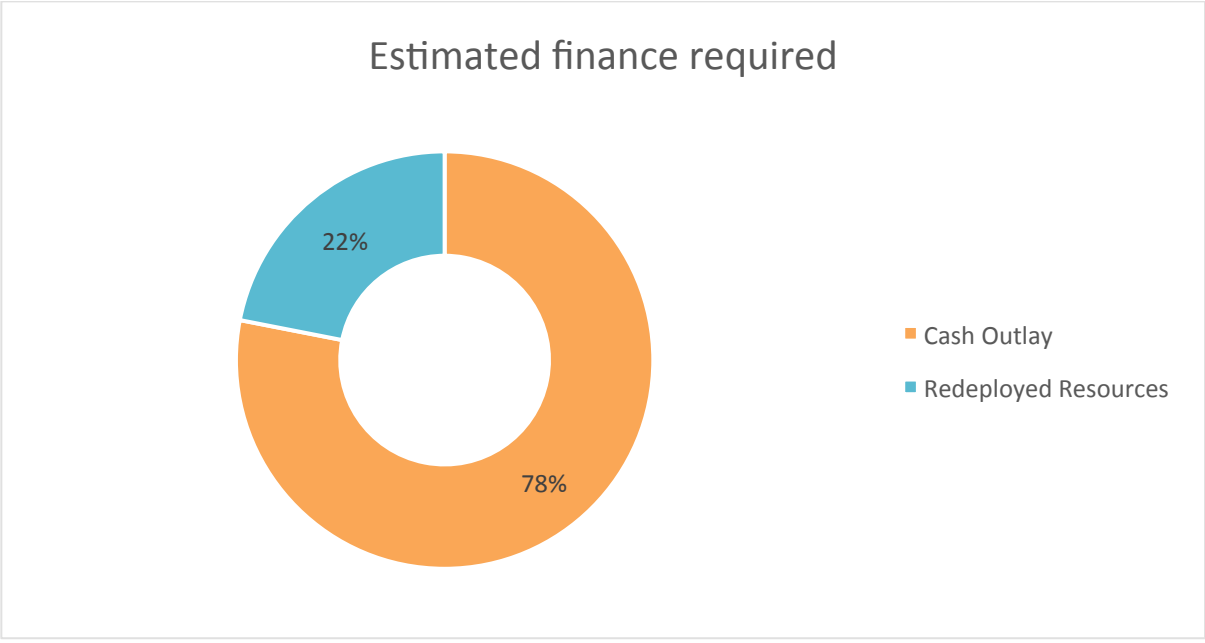

Figure 9: National eHealth Strategy estimated finance required, including separation between cash outlay and redeployed resources

ICT costs are estimated at N$256m, about 72% of the total costs. Organisational costs are estimated at $98m, some 28%. This large proportion of ICT costs is attributed to the work required to lift the baseline of the current ICT environment up, including establishing infrastructure, software platforms, and interoperability frameworks. There is nevertheless a substantial organisational complement to the estimated budget, almost a third, which includes extra personnel, user engagement and an extensive training programme. These are all essential for benefits realisation.

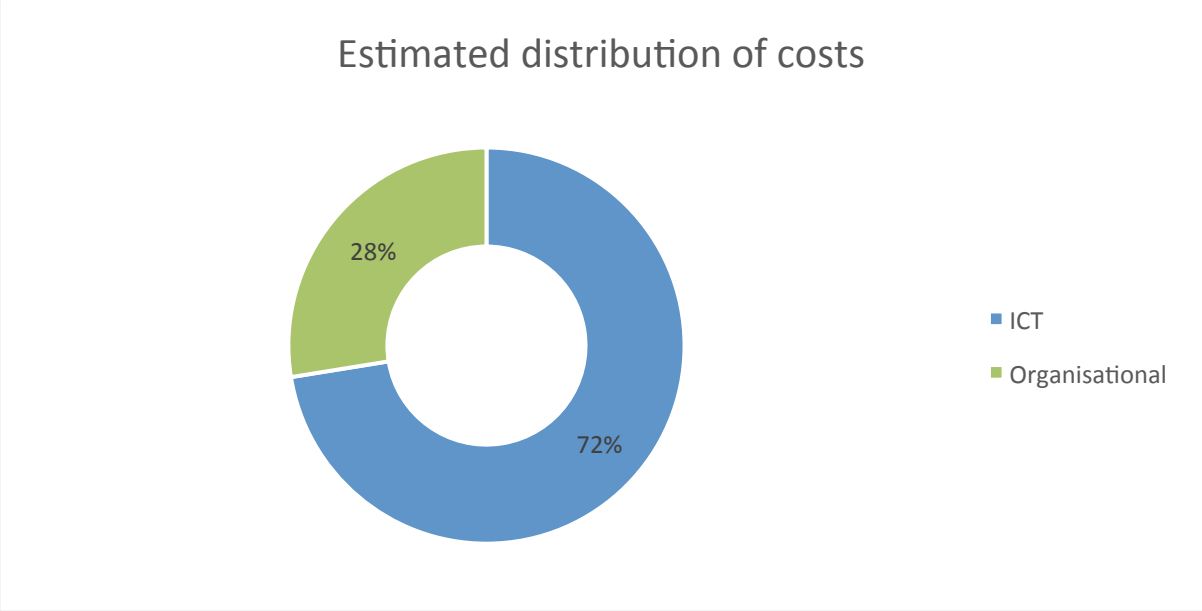

Figure 10: National eHealth Strategy estimated distribution of costs between ICT and organisational costs

All estimates are adjusted for 5% annual inflation and are preliminary. They require a more detailed assessment of activities in the Implementation Plan to arrive at a final budget figure.

The table below provides a breakdown of costing estimates for the National eHealth Strategy. Note that where no budget is shown for a particular activity, this activity will be part of the role fulfilled by personnel appointed under other activity items, particularly under the Leadership and Governance Strategic Objective.

Table 18: eHealth strategy costing estimates (N$)

Strategic Objective	Intervention	Activity	N$
Section 1: Cash Outlay			
SO.1.1: Leadership and coordination of the implementation of the eHealth Strategy strengthened by end of 2021	Establish a National eHealth Steering Committee, chaired by the MoHSS Executive Director to oversee inter-sectoral coordination for successful implementation of the eHealth strategy	Develop and disseminate Terms of Reference (TOR) for the National eHealth Steering Committee, invite applications for membership candidates, and appoint members	**40 000**
		Develop an action plan for eHealth implementation at regional, district and facility levels.	**40 000**

Strategic Objective	Intervention	Activity	N$
		Establish a Secretariat and Conduct regular committee engagements to fulfil the TOR	**400 000**
		Assign roles/responsibilities to the existing positions within MoHSS and create new positions for the effective implementation of eHealth strategy	**5 000 000**
		Develop SOP for the implementation of eHealth strategy	**40 000**
	Establish a National eHealth Projects Office accountable to the eHealth Steering Committee, staffed by fully seconded officials, to drive the implementation of the strategy, support the Technical Working Groups, and support regional eHealth implementation	Establish the TOR, Structure and secure funding for a National eHealth Projects Office	**40 000**
		Second personnel from MoHSS and other government entities to staff the National eHealth Project Office	**Redeployment of resources, see Section 2 below**
	Multiple eHealth implementation teams from National eHealth Projects Office	Define and implement the structure, timelines and operations of the central and regional eHealth Implementation teams	**To be addressed by the National eHealth Projects Office**
		Appoint/assign the eHealth Implementation teams	**12 000 000** **Plus partial resource redeployment, see Section 2 below**
	Establish strategic partnerships for the implementation of the eHealth strategy	Develop and publish a Data Governance framework for health information, in coordination with relevant stakeholders	**To be addressed by the National eHealth Projects Office**
		Implement a programme on health promotion behaviour	**505 000**
		Implement a programme of activities to inform and sensitise health professional communities and lead the required changes in behaviour and practices	**185 000**
SO.1.2: Collaborative, integrated working	Develop the eHealth Technical Working Groups (TWGs) required to	Establish different specialised eHealth Standards Technical Working Groups led by MoHSS	**1 385 000**

Strategic Objective	Intervention	Activity	N$
arrangements established in the oHSS by end of 2021	implement the eHealth plan, such as for Standards and Interoperability, Regulation, Stakeholder Engagement, Health Information Systems and other	Establish MoUs with key stakeholders such as, Ministry of ICT, Home Affairs, Telecom and others.	**To be addressed by the National eHealth Projects Office**
		Host an annual eHealth stakeholder conference, supported by National eHealth Steering Committee	**370 000**
SO.1.3: Manage change effectively from 2021	Develop an effective, comprehensive change management plan	Identify the Change Management Champions and develop a comprehensive change management plan	**To be addressed by the National eHealth Projects Office**
	Implement required change management processes to secure support from all stakeholders	Identify and define the roles of change agents across all Directorates and units in MOHSS to lead the change management and transformation plan	**To be addressed by the National eHealth Projects Office**
SO.1.4: eHealth net benefits secured through effective M&E of the strategy from January 2021	Implement an effective M&E framework for the eHealth Strategy	Present M&E milestones to the National eHealth Steering Committee on a quarterly basis	**To be addressed by the National eHealth Projects Office**
	Independent M&E unit	Establish an Independent M&E unit to oversee the eHealth Strategy and Implementation plan	**3 740 000 Plus partial resource redeployment, see Section 2 below**
SO. 2.1: Identify cost effective solutions and sustainable approaches for implementation of the eHealth strategy attained by 2025	Establish an eHealth Impact framework and use it to ensure that eHealth systems achieve required health system benefits, sustainably	Develop an eHealth Impact framework and define the parameters to make the investment case	**160 000**
	Assess all eHealth systems prospectively, before finances are allocated, to ensure that net benefits are realised	Conduct an impact assessment containing among others the cost-benefit analysis, publish this as reference material and also as a marketing tool	**To be addressed by the National eHealth Projects Office**
SO. 2.2: Mobilise sustainable long term resourcing, including providing domestic funding and coordinating international/donor contributions to eHealth strategy	Establish the investment case to secure government budget for eHealth strategy implementation	Establish an investment committee to facilitate sound management of eHealth investments	**185 000**
		Submit an investment case for the eHealth Strategy for National Treasury and NPC to consider addressing through voted funds and donor support	**160 000**

Strategic Objective	Intervention	Activity	N$
implementation by 2025	Align private sector and donor investment in the e-Health strategy	Develop a standard Business Case template for use by individual initiatives based on the Investment Case modules	**160 000**
		Develop expression of interest for public/ private partnership to support the implementation of specific eHealth Strategy business cases	**To be addressed by the National eHealth Projects Office**
		Incorporate specific business cases into donor application plans and grant applications	
	Establish a long term approach for sustainable funding of eHealth initiatives beyond deployment, to ensure eHealth system sustainability	Develop a long term plan to maintain, upgrade and improve eHealth systems beyond deployment	**To be addressed by the National eHealth Projects Office**
	Monitor the investment platform performance	Submit regular reports on action plans for discussion by the investment committee	
SO.2.3: Create a collaborative research environment for by 2021	Establish an eHealth research and development agenda with academic institutions	Develop eHealth research theme and concept note for NCRST and academic institutions to consider	**160 000**
SO.3.1: National eHealth Platform established by 2025	Identify priority user requirements and identify relevant applications to address these needs	Conduct a needs assessment, with extensive stakeholder engagement, and publish findings	**111 000**
		Establish SOPs to guide software application development processes	**160 000**
		Identify and prioritise critical applications to be developed	**160 000**
	Establishment of a comprehensive and integrated eHealth management system inclusive of applications of medical financial administrative and legal compliances	Develop and publish an over-arching systems architecture to align systems development activities to the priorities identified in the needs assessment, which will be known as the National eHealth Platform	**960 000**
		Develop and publish policy guidelines requiring all stakeholders to align development activities to the National eHealth Platform systems architecture	**To be addressed by the National eHealth Projects Office**

Strategic Objective	Intervention	Activity	N$
		Evaluate existing software and establish a roadmap for transitioning them to the National eHealth Platform architecture	**320 000**
		Train key staff in PRINCE2 Project management	**185 000**
	Establish an in-house electronic Patient Information System	Develop a Project Charter and establish a roadmap for developing and implementing an in-house electronic Patient Information System	**To be addressed by the National eHealth Projects Office**
		Evaluate existing software solutions and establish a roadmap for transitioning them to the electronic Patient Information System roadmap	
		Implement the roadmap to achieve a holistic patient-focused electronic Patient Information System (professional time)	**21 000 000**
		Roll out the electronic Patient Information System to all facilities (implementers)	**7 370 000** **Plus partial resource redeployment, see Section 2 below**
	Establish mechanisms to prevent duplicate notifications. Unique identification can be used to address this (for example, by issuing national identities; possibly identification of the parents, or any identifier e.g. biometrics).	Develop a plan to ensure that all patients can access eHealth services. This includes providing for different methods of patient identification and patient enrolment using multiple methods e.g. use of biometrics where no national Identification cards are not available	**240 000**
	Principles of single source and single entry	Define the policies and SOPs guiding single source and single source entry	**To be addressed by the National eHealth Projects Office**
	Business process re-engineering	Develop and implement a comprehensive plan for Business Process Re-engineering prior to eHealth system development	**468 000**

Strategic Objective	Intervention	Activity	N$
SO.3.2: Patients' experience of care improved by implementing priority applications by 2022	Establish a web-based and/or Apps engagement tool to support implementation of the e-Health Strategy	Implement a mobile and/or web-based engagement tool to support the effective collaboration of stakeholders and oversight of the eHealth Strategy and its Strategic Objectives	**720 000**
		Provide patients with access to key information, such as appointments, through a patient portal	**960 000**
	Keep patients engaged via notifications (e.g. SMS or in-app notifications)	Notify patients about key information (e.g. appointments, general health information) using existing electronic communication channels	**720 000**
	Develop a core suite of modules, based on priority user requirements, particularly the patient-user and clinical-user, that are all integrated and interoperable	Establish a list of priority Apps and applications to be built and identify critical systems and build these apps	**6 480 000**
		Invite relevant developers to develop the Apps and applications aligned to the National eHealth Platform and national standards and interoperability framework	**6 111 000**
SO.4.1: Health information availability and sharing strengthened by 2022	Establish a National standards and interoperability framework including the foundations of the unique identifier and incorporate international standards like ICD11 and HL7, FHIR etc. for data and information exchange, aligned with the national interoperability framework	Develop and publish a Normative Standards Framework for all information systems, paper based and eHealth initiatives that clearly defines SOPs for implementing new HIS, adapting existing HIS, HIS management and prioritise standards for critical systems	**517 000**
		Develop a proof of concept for Unique ID approach and develop national Unique Id strategy in line with interoperability strategies	**240 000**
	Design the interoperability platform	Develop an interoperability architecture for Namibia's eHealth initiatives	**240 000**
		Design the technical approach to deliver the interoperability architecture	**517 000**
	Implement the interoperability platform	Secure the required human and infrastructure resources needed to build the National eHealth Platform	**9 000 000** **Plus partial resource redeployment, see Section 2 below**

Strategic Objective	Intervention	Activity	N$
		Develop key interoperability components of the eHealth Platform, specifically prioritising: the API for HIM, Master Patient index, Master facility list, Data Warehouse, National data dictionary and minimum indicator set, and registries	**720 000**
		Deploy and maintain the National eHealth Platform	**640 000**
	Publish interoperability artefacts for systems developers to use	Publish the national interoperability framework	**To be addressed by the National eHealth Projects Office**
	Establish electronic Master Patient Index (MPI) for use for the health system	Establish electronic Master Patient Index (MPI) for use for the health system	**160 000**
	Establish registries and national data dictionaries	Establish an electronic national facility register	**160 000**
		Establish an electronic national data dictionary for the minimum indicator and data set	**160 000**
		Establish an electronic national health workforce register	**480 000**
SO.5.1: All users accessing eHealth tools by end of 2024	Connect health facilities in the country with the minimum bandwidth required for optimal access to eHealth systems	Establish a minimum specification for connectivity required by the MoHSS, detailing specifications for different types of facilities, and different types of users	**To be addressed by the National eHealth Projects Office**
		Implement a regular update schedule to update this specification according to new applications emerging in the Namibian eHealth environment, including WIFI access for patients	
		Continued dialogue with the telecommunications authorities to support mobile and the case for eHealth expansion for the last mile and leveraging universal services funds	
		Complete the rollout of national connectivity to support the minimum connectivity specification	**100 000 000**
	Establish an effective and	Identify the most appropriate server	**80 000**

Strategic Objective	Intervention	Activity	N$
	secure operational environment for e-Health infrastructure, including strengthening the MoHSS physical server hosting environment	hosting approach to meet the needs of National services and applications, and interoperability platform	
		Develop a master configuration plan for the server infrastructure approach identified	**To be addressed by the National eHealth Projects Office**
		Procure the appropriate infrastructure and/or services for the server infrastructure approach identified	**4 880 000**
		Establish SOPs for all key systems administration processes, including user management, server management, instance management, and security	**80 000**
		Develop policy document for all systems administration processes, aligned to the eHealth Strategy	**To be addressed by the National eHealth Projects Office**
		Train all relevant stakeholders on SOPs	**185 000**
		Initiate a regular internal audit cycle of all SOPs	**To be addressed by the National eHealth Projects Office**
	Provide health workers and ICT workers with necessary equipment for accessing information	Develop a minimum specification for user devices fit for purpose (health workers, ICT workers)	**To be addressed by the National eHealth Projects Office**
		Develop and implement a plan for bringing devices up to the minimum specification	**22 000 000**
		Develop a policy on BYOD (health workers, ICT workers, patients)	**To be addressed by the National eHealth Projects Office**
		Develop a pro-active maintenance and replacement plan for all devices, including a plan for supply of consumables, where appropriate	
	Establish registries and national data dictionaries	Establish an electronic national facility register	**160 000**
		Establish an electronic national data dictionary for the minimum indicator	**160 000**

Strategic Objective	Intervention	Activity	N$
		and data set	
		Establish an electronic national health workforce register	**160 000**
	National eHealth Service Desk hosted in MoHSS	Establish a National eHealth Service Desk hosted in MoHSS	**2 240 000** **Plus partial resource redeployment, see Section 2 below**
SO.6.1: eHealth regulatory framework strengthened by end of 2024	Review policies and laws that govern eHealth in the country to produce a gap analysis	Review eHealth strategy and identify priority regulatory aspects	**80 000**
		Identify appropriate regulatory process for each priority regulatory aspect (Policy and/or Guideline and/or Legislation)	**To be addressed by the National eHealth Projects Office**
		Draft regulatory documents in consultation with stakeholders	**320 000**
	Establish a roadmap for addressing the required regulations	Establish a roadmap to address the gaps identified with legislation, policies, SOPs, guidelines	**To be addressed by the National eHealth Projects Office**
		Publish regulations after processing through appropriate channels	
		Publish specific policy and regulations on cybersecurity, data protection and local "home-grow" solution development	**80 000**
	Monitor compliance with the policies and laws	Conduct regulatory compliance testing on priority aspects, across all implementers in Namibia	**320 000**
SO.7.1: Build capacity of MoHSS to implementation team strengthened by 2021	Develop an integrated eHealth Human Capital Development plan for those managing and leading the eHealth Strategy, including aspects of conditions of service and staff retention	Engage with MoHSS management and stakeholders to identify capacity development requirements and opportunities for the workforces	**185 000**
		Develop and publish a comprehensive human resources development plan for eHealth	**320 000**
	Engage with partners to support implementation of the eHealth Human Capital Development (HCD) plan	Consultations with partners to develop eHealth training strategies	**185 000**
		Implementation of the workforce strengthening plan	**To be addressed by the National eHealth Projects Office**

Strategic Objective	Intervention	Activity	N$
		Include the establishment of an eHealth Leadership Development programme	**185 000**
	Implement the eHealth HCD plan for those managing and leading the eHealth Strategy	Engage with implementation stakeholders to identify requirements and opportunities to support a workforce strengthening plan	**185 000**
		Create incentives for local ICT organisations to recruit and retain local ICT professionals to contribute to systems development and maintenance for the eHealth Strategy	**To be addressed by the National eHealth Projects Office**
SO.7.2: Build capacity of all categories of end users (health workers, administrators) to effectively implement the eHealth Strategy by 2022	Implement the eHealth Human Capital Development plan for those managing and leading the eHealth Strategy	Manage effective implementation of the implementation workforce strengthening plan	**To be addressed by the National eHealth Projects Office**
		Improve human resource management system to encourage problem solving regarding use of eHealth solutions	
		Develop eHealth skills retention policy in consultation with stakeholders	
	Train staff in the skills required to use eHealth systems	Partner with local higher education institutions and Niipam to conduct staff training (health workers and ICT workers)	**185 000**
		Offer basic ICT training to existing health workers through a local institution	**385 000**
		Implement on-job training and e-Learning for currently employed workforce, especially for application/system specific training	**Redeployment of resources, see Section 2 below**
		Conduct Training-of-Trainers for nursing and medical training staff on eHealth strategy and ICT	**385 000**
	Implement appropriate eHealth solutions that respond to workforce needs	Conduct training needs analysis for the existing workforce	**Redeployment of resources, see Section 2 below**
		Create user groups for the workforce as a platform to learn, voice their concerns and solve problems	**185 000**

Strategic Objective	Intervention	Activity	N$
S.O. 7.3: Build capacity of training institutions to produce skilled personnel that will manage the eHealth Strategy by 2025	Develop an eHealth training curriculum for different ICT workers and health workers	Collaborate with institutions of higher learning and other stakeholders to develop and/or adapt appropriate training programs	**To be addressed by the National eHealth Projects Office**
		Develop modularised eHealth training curricula for health workers and ICT workers separately	
		Partner with local Higher Education Institutions (HEIs) to develop the Health Informatics curriculum	
	Integrate ICT skills development in clinical staff training	Integrate ICT skills development in clinical staff training	**To be addressed by the National eHealth Projects Office**
	Seek accreditation for Health Informatics professionals with the Namibian Health Profession Council	Enter into a dialogue with the Namibian Health Profession Council about accreditation	**74 000**
		Submit the proposed modularised eHealth training curricula for various type of workers for approval by NAHPC and NQA	**To be addressed by the National eHealth Projects Office**
Section 2: Resources redeployed			
SO.1.1: Leadership and coordination of the implementation of the eHealth Strategy strengthened by end of 2021	Establish a National eHealth Projects Office accountable to the eHealth Steering Committee, staffed by fully seconded officials, to drive the implementation of the strategy, support the Technical Working Groups, and support regional eHealth implementation	Second personnel from MoHSS and other government entities to staff the National eHealth Project Office	**20 000 000**
		Appoint/assign the eHealth Implementation teams	**12 000 000**
	Independent M&E unit	Establish an Independent M&E unit to oversee the eHealth Strategy and Implementation plan	**3 740 000**
SO.3.2: Patients' experience of care improved by implementing priority applications by 2022		Roll out the electronic Patient Information System to all facilities (implementers)	**7 000 000**

Strategic Objective	Intervention	Activity	N$
SO.4.1: Health information availability and sharing strengthened by 2022	Implement the interoperability platform	Secure the required human and infrastructure resources needed to build the National eHealth Platform	**6 000 000**
SO.5.1: All users accessing eHealth tools by end of 2024	National eHealth Service Desk hosted in MoHSS	Establish a National eHealth Service Desk hosted in MoHSS	**11 000 000**
SO.7.2: Build capacity of all categories of end users (health workers, administrators) to effectively implement the eHealth Strategy by 2022	Train staff in the skills required to use eHealth systems	Implement on-job training and e-Learning for currently employed workforce, especially for application/system specific training	**480 000**
	Implement appropriate eHealth solutions that respond to workforce needs	Conduct training needs analysis for the existing workforce	**560 000**
			277 168 000

Table 19: Adjustment for 5% inflation per annum (N$)

Item	Before adjustment	After adjustment
Cash outlay	216 388 000	276 172 015
Redeployed resources	60 780 000	77 572 393
	277 168 000	353 744 408

Appendix 5: Alignment with Global Strategy on Digital Health 2020-2025

This appendix provides analysis of alignment between the National eHealth Strategy of the Republic of Namibia 2021-2025 and the Global Strategy on Digital Health 2020-2025. It is an appendix to the National eHealth Strategy of the Republic of Namibia.

The Global Strategy on Digital Health responds to numerous resolutions of the United Nations General Assembly, the World Health Assembly, and various World health Organisation Regional Committees. These call for member states, regions and the global community to develop digital health strategies that promote evidence-based digital health interventions that will enable health systems strengthening for the benefit of all people in a manner that is ethical, safe, secure, reliable, equitable and sustainable.

1. Alignment with Proposed Actions for Member States

There is considerable alignment between the two documents, despite the fact that the two strategies are organised differently. This alignment is best demonstrated by comparing the actions of the Namibian National eHealth Strategy Implementation Plan with the Global Strategy's Proposed Actions for Member States. The majority of proposed actions are addressed substantively in the Namibian strategy.

Regarding the structure of the documents, the Global Strategy is organised around four main strategic objectives:

- Promote global collaboration and advance the transfer of knowledge on digital health
- Advance the implementation of national digital health strategies
- Strengthen governance for digital health at global, regional and national levels
- Advocate people-centred health systems that are enabled by digital health.

The Namibian National eHealth Strategy follows the structure of the WHO/ITU National eHealth Strategy Toolkit, which is arranged according to the following components:

- Leadership and governance
- Strategy and investment
- Software services and software applications
- Standards and interoperability
- eHealth infrastructure
- Legislation, policy and compliance
- Workforce.

The tables below list all the proposed actions for member states that are included in the Global Strategy. For each action, relevant sections of the Namibian Strategy are provided showing the extent to which the strategy addresses each proposed action, which strategic objective addresses the item, and the target year for delivering each action.

Table 20: Alignment with Strategic Objective 1 of the Global Strategy

Strategic objective 1: Promote global collaboration and advance the transfer of knowledge on digital health	
Short-term (1-2 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Promote and participate in collaborations and partnerships for sustainability of digital health to accelerate adoption	Establish coordination structures and strategic partnerships *(SO.1.1: Leadership and coordination of the implementation of the eHealth Strategy strengthened by end of 2021)*
Identify and share information about gaps, priorities and resources needed for research in digital health	Establish an eHealth research and development agenda with academic institutions *(SO.2.3: Create a collaboration research environment by 2021)*
Establish dedicated bodies and governance mechanisms to prioritize and implement digital health at national level including in times of emergency	Establish a governance structure that includes a dedicated National eHealth Projects Office *(SO.1.1: Leadership and coordination of the implementation of the eHealth Strategy strengthened by end of 2021)*
Participate in multistakeholder groups convened by the WHO Secretariat to support scaling up of digital health and innovation at national level.	Establish eHealth Technical Working Groups *(SO.1.2: Collaborative, integrated working arrangements established in the MoHSS by end of 2021)*
Conduct a stakeholder analysis and identify suitable actions to engage each group contextualized to different public health situations including preparedness and response.	Establish MoUs with key stakeholders such as Ministry of ICT, Home Affairs, Telecom and others *(SO.1.2: Collaborative, integrated working arrangements established in the MoHSS by end of 2021)* Identify Change Management Champions and develop a comprehensive change management plan *(SO.1.3: Manage change effectively from 2021)* Conducting a needs assessment to identify priority user requirements, with extensive stakeholder engagement, and published findings in 2021 *(SO.3.1: National eHealth Platform established by 2025)*
Medium-term (2-4 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Establish centres of excellence or innovation hubs to assess and promote digital health solutions that are aligned with country-defined needs	Establish a research and development agenda with academic institutions *(SO.2.3: Create a collaboration research environment by 2021)*
Participate in regional and global dedicated bodies and governance mechanisms to contribute to the efforts in prioritizing digital health	Recognition of the importance of aligning with global standards on eHealth practice and data quality *(Table 1. Guiding principles of eHealth in Namibia)*

Establish an appropriate and sustainable digital health ecosystem driven by sound common principles contextualized to public health priorities and needs including with reference to emergencies	Develop an effective, comprehensive change management plan that will identify the Change Management Champions and develop a comprehensive change management plan; and to Implement required change management processes to secure support from all stakeholders by identifying and define the roles of change agents *(SO.1.3: Manage change effectively from 2021)*
Ensure information sharing for measuring national digital health maturity level (including information on digital health infrastructure, knowledge, technologies and use, etc.) in progress towards universal health coverage, healthier populations and emergencies targets of the Sustainable Development Goals and WHO's Thirteenth General Programme of Work, 2019–2023	Extensive activities to promote information sharing, including establishing the Namibia e-Health Standards and Interoperability Framework which includes the foundations of the Unique Identifier and incorporate international standards such as ICD10, ICD 11 and HL7 which includes FHIR, etc. for data and information exchange (*SO.4.1: Health information availability and sharing strengthened by 2022)*
Long-term (4-6 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Facilitate joint learning through communities of practice and curriculum-based training initiatives to enhance country capacity on digital health	Develop eHealth training curricula for different ICT workers and health workers, integrate ICT skills development in clinical staff training, and to seek accreditation for Health Informatics professionals with the Health Professions Councils of Namibia (HPCNA) *(S.O. 7.3: Collaborate with training institutions to produce skilled personnel who will manage the eHealth Strategy by 2025)*
Foster intersectoral and integrated engagement in digital health development across government, and expand support on adopting and managing digital health solutions	The MoHSS has formed an eHealth Steering Committee consisting of the Executive Director, Deputy Executive Director and all Directors within MoHSS as well as a HIS Technical Working Committee consisting of various other ministries and institutions. *(Section on The Current State of eHealth)*

Table 21: Alignment with Strategic Objective 2 of the Global Strategy

Strategic objective 2: Advance implementation of national digital health strategies	
Short-term (1-2 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Conduct a stakeholder analysis and identifying suitable actions to engage each group contextualised to different public health situations including preparedness and response	The Namibian strategy does not include a stakeholder analysis of this kind.
Conduct a comprehensive assessment of the existing hardware and connectivity landscape in order to identify infrastructural needs and solutions	This landscape assessment has been completed in Namibia.

to drive digitalization	
Establish well-informed and effective national coordination mechanisms for governance of digital health	Establish coordination structures and strategic partnerships *(SO.1.1: Leadership and coordination of the implementation of the eHealth Strategy strengthened by end of 2021)*
Develop (or ensure in place) a national digital health strategy or equivalent strategic framework	The National eHealth Strategy 2021-2025 has been completed.
Prioritize national investment in digital health in support of primary health care and universal health coverage	Establish the investment case to secure government budget for eHealth strategy implementation in 2021. *(SO. 2.2: Mobilise sustainable long-term resourcing, including providing domestic funding and coordinating international/donor contributions to eHealth strategy implementation by 2025)*
Involve stakeholders in the planning and implementation of digital health, including professional associations, patient and family organizations. Promote engagement with communities, health-care workers and those in other sectors by identifying (1) champions to help take advantage of and promote digital initiatives, and (2) central and cross-sectoral governance mechanisms for health-related innovations	Engage with partners/stakeholders to support implementation of the eHealth Human Capital Development (HCD) plan *(SO.7.1: Human resource capacity of MoHSS to implement eHealth Strategy strengthened by 2022)*
Expand the digital health workforce and promote capacity-building to develop, update and implement national strategies and investment plans for digital health	Conduct a training needs assessment for the workforce, and develop an integrated eHealth Human Capital Development plan for those managing and leading the eHealth Strategy *(SO.7.1: Human resource capacity of MoHSS to implement eHealth Strategy strengthened by 2022)* Implement an eHealth Human Capital Development plan for those managing and leading the eHealth Strategy *(SO.7.2: Build capacity of all end user categories (health workers, administrators) to effectively implement the eHealth Strategy by 2023)*
Implement management procedures for programmes, risks and change management	Develop a comprehensive change management plan, and implement required change management processes to secure support from all stakeholders *(SO.1.3: Manage change effectively from 2021)* Develop a comprehensive plan for Business Process Re-engineering prior to eHealth system development by 2022 *(SO.3.1: National eHealth Platform established by 2025)*
Review, develop, and/or revise specific laws and policies, if necessary, with respect to data privacy, security, confidentiality, standardization, exchange, accessibility and interoperability	Review policies and laws that govern eHealth in the country to produce a gap analysis, establish a roadmap for addressing the required regulations including specific policy and regulations on cybersecurity, data protection and supporting local "home-grown" solutions, and monitor compliance with the policies and laws *(SO.6.1: eHealth*

	regulatory framework strengthened by end of 2024)
Share good practices and lessons learned with other countries and the international community, through existing or new regional and global networks	The Namibian strategy does not include specific actions on sharing good practices and lessons learned with the international community.
Medium-term (2-4 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Mobilize adequate funding to support the cost of acquisition or licensing, implementation and maintenance of necessary hardware infrastructure, software, workforce capacity building and other technical resources required	Establish a long-term approach for sustainable funding of eHealth initiatives beyond deployment, to ensure eHealth system sustainability in 2021; and align private sector and donor investment in the e-Health strategy in 2022. *(SO. 2.2: Mobilise sustainable long-term resourcing, including providing domestic funding and coordinating international/donor contributions to eHealth strategy implementation by 2025)*
Develop and/or adapt a set of open health data standards to be used in digital health interventions, with a compliance and enforcement mechanism	Commitment to use open standards (Table 1: Guiding principles for eHealth in Namibia) Establish a national standards and interoperability framework, including data and information exchange *(S.O.4.1: Health information availability and sharing strengthened by 2022)*
Enhance awareness of emerging or cutting- edge digital health technologies and assess applicability and use of these technologies	Emerging technologies are recognised, including: mobile devices and the emergence of the Internet of Things (IoT); data science disciplines such as advanced analytics, Artificial Intelligence (AI) and Machine Learning (ML); emerging connectivity technologies such as Television whitespace and 5G; sensors to populate digital devices with data. *(Emerging opportunities for the implementation of the eHealth Strategy)* Implement a regular update schedule to update this specification according to new applications emerging in the Namibian eHealth environment *(SO.5.1: All users accessing eHealth tools by end of 2024)*
Promote national scientific, professional and patient associations as active participants in the national digital health development	Enter into a dialogue with the Health Professions Councils of Namibian about accreditation, including to Seek accreditation for Health Informatics professionals with the Health Professions Councils of Namibia *(S.O. 7.3: Collaborate with training institutions to produce skilled personnel who will manage the eHealth Strategy by 2025)*
Long-term (4-6 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia

Monitor the performance and progress of digital health by adapting or using available tools or maturity model, including tools and training materials, on the status of development and implementation progress of the digital health strategy. Support the development and implementation of a resilient national digital health architecture blueprint, using known enterprise architecture framework or methodology	Monitor the investment platform performance in 2022. *(SO. 2.2: Mobilise sustainable long-term resourcing, including providing domestic funding and coordinating international/donor contributions to eHealth strategy implementation by 2025)* Establishment of a comprehensive and integrated eHealth management system inclusive of applications of medical financial administrative and legal compliances by 2022; and develop a comprehensive plan for Business Process Re-engineering prior to eHealth system development by 2022 *(SO.3.1: National eHealth Platform established by 2025)*
Establish and implement policies regarding practice, payment and accreditation for delivering integrated health services powered by digital solutions	Monetize eHealth System by 2024. *(SO. 2.2: Mobilise sustainable long-term resourcing, including providing domestic funding and coordinating international/donor contributions to eHealth strategy implementation by 2025)*

Table 22: Alignment with Strategic Objective 3 of the Global Strategy

Strategic objective 3: Strengthen governance of digital health at global, regional and national levels	
Short-term (1-2 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Analyse and document national start-ups working on innovative solutions to identify those that may have a sustainable impact on health and well-being	The Namibian strategy does not include activities relating to start-ups.
Develop an implementation plan for digital health technologies in the context of health system strengthening, health emergency response and healthy populations	The strategy includes an implementation with specific items such as to establish an effective and secure operational environment for e-Health infrastructure by 2022 *(SO.5.1: All users accessing eHealth tools by end of 2024)* Implement appropriate eHealth solutions that respond to workforce needs by 2022 *(SO.7.2: Build capacity of all end user categories (health workers, administrators) to effectively implement the eHealth Strategy by 2023)*
Ensure the capacity of training institutions to establish and/or expand digital health literacy, provide life-long learning opportunities for digital health, and to have such digital health programmes properly accredited by the relevant authorities	Partner with local higher education institutions and NIPAM to conduct staff training (health workers and ICT workers) by 2022 (*SO.7.2: Build capacity of all end user categories (health workers, administrators) to effectively implement the eHealth Strategy by 2023)*
Medium-term (2-4 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Develop research and promote capacity-building	Consultations with partners/stakeholders to develop

for governments, policy-makers, practitioners and the public in general to take informed decisions, generate trust and support digital health investments	eHealth training strategies; establish an eHealth Leadership Development programme; and Create incentives for local ICT organisations to recruit and retain local ICT professionals to contribute to systems development and maintenance for the eHealth Strategy *(SO.7.1: Human resource capacity of MoHSS to implement eHealth Strategy strengthened by 2022)*
Establish and develop capacity in using artificial intelligence and digital health medical devices under WHO's regulating, benchmarking or certifying frameworks	The Namibian strategy does not address this item directly.
Establish national data governance mechanisms, in accordance with the development of regulatory framework at global level	Review policies and laws that govern eHealth in the country to produce a gap analysis by 2022; and establish a roadmap for addressing the required regulations by 2024 *(SO.6.1: eHealth regulatory framework strengthened by end of 2024)*
Develop capacity, according to country- specific contexts, in planning for and using digital hospitals and digital therapeutics, location-based services, infodemic management during routine and emergency health service delivery	Create incentives for local ICT organisations to recruit and retain local ICT professionals to contribute to systems development and maintenance for the eHealth Strategy *(SO.7.1: Human resource capacity of MoHSS to implement eHealth Strategy strengthened by 2022)*
Participate in global interoperability standards-setting processes for digital health led by WHO and comply with these standards	Includes establish the Namibia e-Health Standards and Interoperability Framework which includes the foundations of the Unique Identifier and incorporate international standards such as ICD10, ICD 11 and HL7 which includes FHIR, etc. for data and information exchange, and designing and implementing an interoperability platform. *(SO.4.1: Health information availability and sharing strengthened by 2022)*
Analyse digital health ecosystem and propose concrete policy actions to advance the achievement of the targets of universal health coverage, the Sustainable Development Goals and WHO's Thirteenth General Programme of Work, 2019–2023 using digital health technologies	Review policies and laws that govern eHealth in the country to produce a gap analysis by 2022; and establish a roadmap for addressing the required regulations by 2024 *(SO.6.1: eHealth regulatory framework strengthened by end of 2024)* Develop an eHealth Technical Working Group (TWG) on Regulation *(SO.1.2: Collaborative, integrated working arrangements established in the MoHSS by end of 2021)*
Long-term (4-6 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Develop target-product profiles and priority characteristics for digital health applications especially relevant to the needs of low- resource settings; define challenges and draw a road map for increased access to those products	Establish a list of priority Apps and applications to be built and identify critical systems, in order to develop a core suite of modules, based on priority user requirements, particularly the patient-user and clinical-user, that are all integrated and

	interoperable *(SO.3.2: Patients' experience of care improved by implementing priority applications by 2022)*
Invest in and maximize the opportunities made available by digital health technologies to strengthen capacity building of health workers in primary health care and public health emergency response	Establish an eHealth Impact framework and use it to ensure that eHealth systems achieve required health system benefits, sustainably *(SO. 2.1: Identify cost effective solutions and sustainable approaches for implementation of the eHealth strategy attained by 2025)* Establish the investment case to secure government budget for eHealth strategy implementation *(SO. 2.2. Mobilise sustainable long term resourcing, including providing domestic funding and coordinating international/donor contributions to eHealth strategy implementation by 2025)*

Table 23: Alignment with Strategic Objective 4 of the Global Strategy

Strategic objective 4: Advocate people-centred health systems that are enabled by digital health	
Short-term (1-2 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Prioritize literacy through an accessible tool that enables understanding digital health technologies and systems	Includes identifying priority user requirements and relevant applications to address these needs by 2022 *(SO.3.1: National eHealth Platform established by 2025)*
Engage with professional organizations, patient associations and civil society organizations as active participants in digital health development and innovations	This is partly addressed by the action to enter into a dialogue with the Health Professions Councils of Namibian about accreditation, including to Seek accreditation for Health Informatics professionals with the Health Professions Councils of Namibia *(S.O. 7.3: Collaborate with training institutions to produce skilled personnel who will manage the eHealth Strategy by 2025)*
Strengthen public trust in digital health technologies and review the different education and training programmes on digital health by institution, level of degree, specialty and cost, and analyse current trends at the national level	The Namibian strategy does not address this item directly.
Promote the use of population health management and gender-equality approaches through digital health applications to move health and well-being from reactive care models to active community-based models	The Namibian strategy does not address this item directly.
Emphasize the role of the patient and enhance health care professionals' understanding of the importance of activate patients in the patients' treatment course	The Namibian strategy does not address this item directly.

Medium-term (2-4 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Develop a digitally capable and gender- balanced health workforce	Offer basic ICT training to existing health workers through a local institution; implement on-job training and e-Learning for currently employed workforce, especially for application/system specific training; and conduct Training-of-Trainers for nursing and medical training staff on eHealth strategy and ICT *(SO.7.2: Build capacity of all end user categories (health workers, administrators) to effectively implement the eHealth Strategy by 2023)*
Ensure competencies on digital health are included in the education and training curricula of all health professionals and allied workers, and at all levels of formal education and informal training	Collaborate with institutions of higher learning and other stakeholders to develop and/or adapt appropriate training programs; and develop modularised eHealth training curricula for health workers and ICT workers separately; and partner with local Higher Education Institutions (HEIs) to develop the Health Informatics curriculum *(S.O. 7.3: Collaborate with training institutions to produce skilled personnel who will manage the eHealth Strategy by 2025)*
Developing population health management approaches through digital health solutions that move health and well-being from reactive care models to active community- based models	The Namibian strategy does not address this item directly.
Long-term (4-6 years)	
Global Strategy on Digital Health	National eHealth Strategy of Namibia
Develop capacity to allow individual feedback for validating the performance of digital health tools and services under a framework led by WHO	Create user groups for the workforce as a platform to learn, voice their concerns and solve problems by 2022 *(SO.7.2: Build capacity of all end user categories (health workers, administrators) to effectively implement the eHealth Strategy by 2023)*
Ensure electronic patient health records are established	Establish a comprehensive and integrated eHealth management system inclusive of applications of medical financial administrative and legal compliances; establishing an in-house electronic Patient Information System *(SO.3.1: National eHealth Platform established by 2025)* Develop a core suite of modules, based on priority user requirements, particularly the patient-user and clinical-user, that are all integrated and interoperable *(SO.3.2: Patients' experience of care improved by implementing priority applications by 2022)*
Foster digital health literacy at population level and raise awareness of patients' rights and the	Establish a web-based and/or Apps engagement tool to support implementation of the e-Health Strategy, and keeping patients engaged via

concept of dynamic consent	notifications such as SMS or in-app notifications *(SO.3.2: Patients' experience of care improved by implementing priority applications by 2022)*
Ensure digital health solutions are informed by the social determinants of health	Conduct needs assessments, with extensive stakeholder engagement, with published findings, to identify priority user requirements and identify relevant applications to address these needs (*SO.3.1: National eHealth Platform established by 2025)*
Develop capacity in personalized medicine	The Namibian strategy does not address this item directly.
Synthesize national research and disseminate evidence on the contributions of digital health interventions to the performance of health systems and their impact on people's health and well-being	Establish an eHealth Impact framework and use it to ensure that eHealth systems achieve required health system benefits, sustainably (*SO. 2.1: Identify cost effective solutions and sustainable approaches for implementation of the eHealth strategy attained by 2025)*

Appendix 6: Digital Health Lessons From COVID-19

There is probably no other public health situation quite like a pandemic to emphasise the critical role of digital health in supporting timely decision making that saves lives. COVID-19 has reminded the world of this point. Since COVID-19 appeared, National eHealth Strategies have become more pertinent, and their realisation more urgent. The components of an effective strategy are felt acutely during a pandemic. If interoperable systems are in place, information flows in ways that support rapid responses. When those systems have not been implemented their absence makes data difficult to manage and decisions hard to make confidently.

This document summarises digital health lessons emerging from the COVID-19 experience and identifies key implications for the National eHealth Strategy of the Republic of Namibia.

Experience during the COVID-19 pandemic has shown rapid uptake of digital health.[xxiv] [xxv] Numerous digital initiatives are being utilised to help contain the virus, including tools for services such as remote consultation,[xxvi] [xxvii] contact tracing[xxviii] and patient management.[xxix] Countries existing efforts to improve connectivity and expand their digital economies have also been heightened by COVID-19 experiences,[xxx] and opportunities for eHealth to support health systems' strengthening have been emphasised.[xxxi] The pandemic's serious and sustained challenges have accelerated digital transformation in many places.

All this has occurred against a backdrop of growing recognition for the role of digital health in advancing Universal Health Coverage (UHC).[xxxii] The World Health Organization (WHO) has been encouraging member states to adopt digital health[xxxiii] across a wide range of applications for more than a decade, including through the World Health Assembly and the Regional Offices.[xxxiv] Health-strengthening capabilities of digital health are no longer disputed and are deemed necessary to meet UHC objectives.

The pandemic has placed most countries' health systems under strain. Not only do they experience supply shortages, including of personal protective equipment (PPE) for frontline health workers, other COVID-19 related factors increase pressures on the health system, such as the increased mortality rate and deaths, mental health and substance abuse caused by significantly changes to daily lives, and lifestyle changes, including reduced physical activity levels that could prompt a resurgence of non-communicable diseases during or post COVID-19.[xxxv]

The social impact of COVID-19 has also been significant, highlighted by socio-economic issues precipitated by the closure of borders, supply disruptions, depreciation of currencies, as well as dramatic scaling down of human and industrial activities,[xxxvi] increasing gender-based violence cases during lockdowns, and increased social unrest with continued travelling restrictions and national lockdowns threatening lack of food supply and incomes.

These issues place unprecedented challenges on the health system, which require novel and innovative solutions. Lessons from the pandemic thus far have shown that digital health can help in a number of ways.

1. Digital Health Lessons

Since COVID-19 is likely to present further waves, and future pandemics are likely, health care systems must continue to identify and apply lessons for strengthening. The value of digital health tools is gained only when they are in place, emphasising that when a pandemic hits it is too late to accelerate implementing actions of a national strategy, so keeping implementation on track before the pandemic is important.

Emerging technologies offer further potential to help move health services forward more rapidly than almost any other time in history with automation and intelligence. This heightens the urgency to implement National eHealth's Strategies, so that countries can begin to experience the benefits of having access to the critical digital tools needed to respond adequately to a pandemic. "With properly disaggregated health data, it is possible to plan actions that reduce potential health inequities at all levels of care, and facilitate the implementation of strategies to address such inequities."[xxxvii]

The digital health lessons listed below demonstrate the complex interaction between people, process and technology and show how addressing the challenges of COVID-19 requires our digital health initiatives to embrace all three, supported by a comprehensive a national strategy, in order to be successful.

Table 24: COVID-19 lessons for Namibia's National eHealth Strategy

Strategic topic	Lesson	Implications for Namibia
Leadership and governance	Pandemics help to focus attention on information issues and COVID has empowered ministries of health to take ownership of Digital Health and invest in strengthening digital health platforms	This will support the Minister's existing efforts to invest in eHealth for health systems strengthening
	Quick decisions in complex and often contested environments require clear decision making processes to follow	Existing digital health governance processes will be tested and strengthened
	With many competing solutions appearing, leadership and mechanisms for making optimal decisions are key to ensure appropriate solutions are chosen for implementation	The eHealth impact model framework envisaged by MoHSS will help to promote making optimal decisions
	The necessity to communicate forced stakeholders with disparate backgrounds and interests, that previously would not normally engage can work productively towards a common goal. The demand for data is shared across society thus inclusiveness and community participation are essential. For example, data usage agreements were fast tracked proving that it can be done; and the difficulties experienced with tracing contacts led to the development of the mobile app that allows citizens to receive information on whether they have been in close contact with a	There's an opportunity for accelerating collaborative leadership, strengthening cross-government, inter-departmental, holistic planning, in advance, including contingency planning for management of inter-departmental co-operation and process engineering, and engagement with all stakeholders to help remove obstacles to accessing the information needed to make decisions, while emphasising people's rights to data protection.

Strategic topic	Lesson	Implications for Namibia
	Covid case.	
	Organisations that create cross-functional data teams, collaborating with external partners, and developing the right governance policies for how data can be used, have better success	Existing stakeholder engagement efforts can be enhanced to strengthen a collaborative ecosystem of constructive use of information to make better health systems decisions
Services and applications	Ministries and organisations have been driven to innovative by to maximise available technologies such as chatbots, GIS tracking, communication platforms, social media etc.	MoHSS will benefit from sharing lessons learned with other countries in Africa and elsewhere
	Use information systems that are already known to users, since scenarios where new systems were implemented required much more training and support than systems which were known to the users. Pandemics are not the time to introduce new systems. Systems like DHIS2 which is in use as country HMIS were able to be implemented in multiple countries.	There is support for utilising existing, known solutions for Namibia's COVID-19 response efforts
	Chatbots move conversations along and there are several examples of organizations including governments, employers, providers, and funders to use conversational technologies to provide current information related to COVID-19 to their citizens, employees, patients, and beneficiaries. Ongoing research aims to examine user conversations and how conversations change over time during the course of a pandemic[xxxviii]	Chatbots create opportunities for Namibia to help address human resource constraints; learning from experience in neighbouring countries may be useful
	There's value in emerging data science, helping to see things that are not easily seen with conventional analysis, such as use modelling tools to optimise distribution of critical medical supplies[xxxix]	Incorporating data science modelling may yield benefits
	Location services help track cases and optimise resource planning, so include integration of Geographic Information System (GIS) technology into contact tracing apps for monitoring migration patterns of patients and contact-persons, mapping COVID-19 hotspots and efficient allocation of resources in response	Geolocation functionality should be added to systems requirements specifications
	Rather than focusing on individual pilots with highly specific analytics tools, organizations should adopt more flexible data solutions that can be used in multiple areas and are highly interoperable with other solutions, apply a wider set of tools across a range of use cases	Flexible, scalable solutions should be prioritised
	Enhance existing telemedicine services that	Explore opportunities for expanding

Strategic topic	Lesson	Implications for Namibia
	have already proven to be effective, since this will support social distancing and help optimise resource allocations	existing telemedicine successes
Strategy and investment	Not all of the individual data elements necessary to control a pandemic will be known early on, but HCSs that have been investing in a strong data-driven culture and strategy will be better positioned to be flexible and adjust their analysis on critical patient outcome measures	There are benefits to investing in building a culture and skills for data-driven decision making
Standards and interoperability	Managing a pandemic needs lots of data from different sources. If it's not already interoperable, bringing it together becomes very challenging at the time when there's not time to waste.	Developing a standards-based, interoperable approach, and investing in it ahead of time will be advantageous
Infrastructure	Responding to a pandemic is easier with accurate, real-time, purposeful data. Without connectivity, it won't flow.	Namibia's existing efforts to expand connectivity will be reinforced
	Mobile solutions make data more widely available and facilitate the capturing of data by a broader spectrum of users. There's a need for a low-cost and adaptive contact tracing apps for monitoring and tracing COVID-19 patients and close contacts while enforcing security and privacy of health data.	Namibia's high mobile penetration makes mobile-based solutions appropriate for emphasising in the digital solutions planned for pandemic response
	Technology resources already in place can easily be appropriated or re-purposed to support digital processes and procedures of a pandemic.	Overarching government infrastructure investments may pay dividends

Technology has proved an important tool to support local and regional governments on the frontline of the emergency to provide essential public services during the COVID-19 crisis. As the coronavirus continues to spread around the world, governments have put in place important restrictions on the movement of people, the functioning of services, and rules on physical distancing. Within this context, technology can help to maintain access to key health services and information.

2. Practical Examples

2.1 Developed World

Researchers examined how six hospitals with a long history of health information technology use have responded to the COVID-19 pandemic from an HIT perspective. They concluded "Importantly, the HIT-related responses to COVID-19 were perceived to have further highlighted the value of informaticians for improving care and responding quickly to emergent needs".[xl] The study noted the following lessons:

- Manage time and resources to accommodate high patient volumes
- Streamlined governance processes to expedite responses to COVID-19 patients
- Streamlined workflows to reduce time taken to complete some systems related processes, such as discharges
- Improved medication ordering practices as a response to initial shortages
- Systems interoperability for improved treatment accuracy and effectiveness
- Improved infection control
- Increased telehealth usage and capabilities, particularly for nonessential outpatient appointments
- Utilizing specialised alerts
- Using technology to facilitate minimal-contact ward rounds, reducing the need for personal protective equipment (PPE)

2.2 Southern Africa

In neighbouring South Africa, there are key COVID-19 lessons to share. One emphasised by the Health Minister is the need to prepare a healthcare system that is able to provide UHC demonstrating agility and the need to prepare for future pandemics. South Africa established a National COVID-19 Command Council to take government-wide decisions, implementing an adapted WHO COVID-19 strategy for containing and mitigating the spread of the virus. The strategy included the creation of national and provincial incident management teams (IMTs), which comprised of a variety of work streams, including governance and leadership; medical supplies; port and environmental health; epidemiology and response; facility readiness and case management; emergency medical services; information systems; risk communication and community engagement; occupational health and safety and human resources.

South Africa describes the most salient lessons learnt between March and September 2020 as:

- Strengthened command and control were achieved through both centralised and decentralised IMTs
- Swift evidenced-based decision-making from the highest political levels for instituting lockdowns to buy time to prepare the health system and increase health care capacity.

Nevertheless, although these strategies were successful, the stringent lockdown measures resulted in economic hardship particularly for the most vulnerable sections of the population.

In the absence of a widely available vaccine to prevent the rapid spread of the virus, South Africa focused on the following nonpharmaceutical interventions:[xli]

- Effective governance and leadership
- Strengthen surveillance and strategic information for active and informed use of epidemiological data
- Augment health systems readiness including emergency medical services
- Enhance community engagement and risk communication to reduce spread, and contact tracing and community screening
- Improve laboratory capacity and testing
- Clarify care pathways
- Scale-up infection prevention and control measures
- Boost capacity at ports of entry

- Expedite research and introduction of therapeutics, diagnostics and vaccines.
- Southern Africa

2.3 Personal Comments

Comments from two digital health experts help to illustrate these points.[xlii]

> *"From the wealthiest countries to the poorest, COVID-19, the disease caused by the novel coronavirus has laid bare our common vulnerability to a threat we can't see, an enemy that is not ideological. And it has revealed that our most useful weapon can't be manufactured for profit or hoarded only for the few. Our most useful weapon is accurate information based on high-quality data, plus sound governance to wield those data for the good of all. Where data were available and used, lives have been saved. Where absent, people have suffered in great and preventable numbers."*
>
> *- Manish Kumar of MEASURE Evaluation*

> *"The capacity for a country's health information systems to rapidly predict, identify, test, treat, and monitor health outcomes among people infected with or exposed to COVID-19, will be seen as the differentiator among country responses. So far, we have seen that health information systems even in developed infrastructures in the United States, Asia, and Europe were not yet able to perform all these functions."*
>
> *- Bobby Jefferson of DAI Global Health*

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