The Malawi National eHealth Strategy

2011 - 2016

December 2015

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5.0 E-Health Strategy Implementation, Monitoring and Evaluation

Acknowledgements

The eHealth Strategy document is a result of collaborative effort between the Ministry of Health and development partners. The strategy development process was preceded by an ehealth situation analysis. Throughout the long process, the strategy development team demonstrated dedication and tireless commitment. The Ministry of Health (MoH) is indebted to all the team members for their, sacrifice and contributions.

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Abbreviations and Glossary of Terms

ACT	Artemisinin-based Combination Therapy
ADT	Admission Discharge Transfer
ARV	Antiretroviral Therapy
ARI	Acute Respiratory Infections
COIA	UN Commission on Information and Accountability
CPOE	Clinician Physician Order Entry
DHIS	District Health Information System
eHealth	Electronic Health
EHP	Essential Health Package
eGovernment	Electronic Government
eHMIS	Electronic Health Management Information System
EMR	Electronic Medical Records System
EP&D	Economic Planning and Development
GSMA	Global System for Mobile Association (GSMA)
HMIS	Health Management Information System
HIS	Health Information System
HIV/AIDS	Human immunodeficiency virus
AIDS	Acquired immunodeficiency Syndrome
HSSP	Health Sector Strategic Plan
ICT	Information and Communication Technology
ID	Identity Number
IRS	Insecticide Residual Spraying
M&E TWG	Monitoring and Evaluation Technical Working Group
MACRA	Malawi Communications Regulatory Authority
m-Health	Mobile Health
NCDs	Non Communicable Diseases
NHIS	National Health Information System
NGOs	Non Governmental Organizations
OPD	Outpatient Department
PMTCT	Prevention of Mother to Child Transmission
PPP	Public Private Partnership
SMS	Short Message Service
SP	Sulfadoxine-pyrimethamine
STIs	Sexually Transmitted Infections
Telehealthcare	Provision of health services at a distance using a range of digital and mobile technologies
TNM	Telecom Networks Malawi
UHC	Universal Health Coverage
VLE	Virtual Learning Environment
WHA	World Health Assembly
WHO	World Health Organization
WTDC	World Telecommunications Development Conference

Foreword

In order to strengthen the implementation of Health Management Information Systems (HMIS), the Ministry of Health completed the development of the Health Information Systems (HIS) Strategy in 2013. The aim of the strategy was to address HMIS weakness in support of the Health Sector Strategic Plan (HSSP). Recognizing that addressing these weaknesses in the information age required a comprehensive computerization process, the HIS strategy recommended, as one of its strategies, to have an eHealth Strategy developed. This eHealth Strategy is therefore a fulfillment of the HIS Strategy action item.

The eHealth Strategy aims at building the foundations for ICT infrastructure, implementation of ehealth solutions, facilitating adoption of new ehealth solutions and enhancing governance in the implementation of this strategy. The strategy identifies national ehealth information standards, computing infrastructure, national connectivity services, identification and authentication, reliable power supply and information protection as foundations for ICT infrastructure. The ehealth solutions, which represent the tangible means to interact with the health system electronically, include national priority ehealth solutions, telehealthcare, individual electronic health records and continuous professional development using e-learning.

The MoH is thankful to the team that developed the strategy. The team comprised representatives from Ministry of Health, I-TECH Malawi, Baobab Health Trust, Luke International Norway, the CDC and the eGovernment department. Special thanks to WHO which substantially financed the strategy development process, the CDC and I-TECH Malawi also for their financial and technical support.

M.P. Magwira, PhD
Secretary for Health

1 December 2015

Executive Summary

The main aim of the eHealth Strategy is to support the implementation of the health actions through the computerization of health service delivery. Starting with an ehealth situation assessment, the process for developing the strategy was based on the World Health Organization's and International Telecommunication Union's joint ehealth strategy development toolkit. The draft strategy went through scrutiny of the core technical team and a number of key stakeholder consultations.

The presentation of the eHealth Strategy starts with a contextual analysis which provides justification for the strategy both at global and national levels. At the global level, a number of resolutions made by the World Health Organization and the United Nation's commissions such as the Universal Health Coverage and the UN Commission on Information and Accountability encourage countries to incorporate Information and communication technologies into health service delivery by the year 2015. At national level, the Health Sector Strategic Plan (HSSP) is the main implementation tool for health service delivery. This eHealth Strategy supports the four main outcomes of the HSSP by improving access to health services, improving care and strengthening monitoring and evaluation.

The eHealth Strategy has four main implementation areas namely: the foundations work stream, the ehealth solutions work stream, the change and adoption work stream and the governance work stream. The foundations work stream identifies national ehealth information standards, computing infrastructure, national connectivity services, identification and authentication, reliable power supply and information protection as foundations for ICT infrastructure. Ehealth solutions which represent the tangible means to interact electronically with the health system include national priority ehealth solutions, telehealthcare, individual electronic health records and continuous professional development using e-learning. The change and adoption work stream has awareness campaigns, and education and training while the governance work stream has stakeholders consultation forums and working groups and the eHealth Strategy steering committee.

To provide oversight on the progress of implementation, the strategy further outlines the process for monitoring and evaluating the recommended activities including, outputs, targets and plan of action on Gantt chart. It is therefore believed that this strategy is the best action plan for the Ministry of Health in integrating ICT in the delivery of healthcare services in Malawi.

Introduction

1.1   Definition of Electronic Health (eHealth) and Related Concepts

The World Health Organization (WHO) defines ehealth as the use of information and communication technologies (ICTs) for health services such as treating patients, conducting research, educating providers and students, tracking diseases and monitoring public health. This definition covers a wide domain which includes: electronic health records, routine health management information, vital registration, consumer health informatics, health knowledge management, mobile health (m-health), telehealthcare, virtual healthcare, and health research.

Electronic health records enable collecting, storing, processing and sharing of patient data between points of care while routine health management information systems include web-based surveillance systems, electronic disease registers, and electronic district health information systems, among others. Vital registration systems allow the use of computerized systems for registration of deaths and births. Consumer health informatics provides access to information on health by health individuals. Health knowledge management offers best practice guidelines that are managed and accessed electronically. M-health provides the use of mobile devices such as phones and opportunity for collection, analysis and sharing of information both at patient and aggregate levels. Telehealthcare allows the use of ICTs in providing health care from a distance.

1.2   Context

1.2.1   Global Context

EHealth Strategy is a tool to achieve universal health coverage (UHC) which has been set as a possible umbrella goal for health beyond 2015 development agenda. The UHC is the goal that all people obtain the health services they need without risking financial hardship. It requires strengthening the delivery of health services in five main areas: health systems financing; health workforce; essential medicines and health technologies; health information and resources, governance and health systems service delivery. The WHO report highlights that ICT is an important input to achieve the UHC goals as highlighted by a number of World Health Assembly (WHA) resolutions which require its member states to integrate ICTs in health service delivery as follows: Resolution WHA 58.28 (2005) set the direction and encouraged countries to have ehealth strategies; Resolution WHA 66.26 (2013) focused on national standards, strategies and Internet for health and the World Telecommunications Development Conference Resolution WTDC 65 (2010) calls for development of national ehealth strategies.

Additionally, recommendation 3 of the UN Commission on Information and Accountability (COIA) for Women's and Children's Health states that "By 2015, all countries have integrated the use of information and communication technologies in their national health information systems and health infrastructure".

1.2.2 Malawi Context

As a signatory of the above three resolutions as well as the UN Commission on Information and Accountability (COIA) for Women's and Children's Health which calls for global reporting, oversight and accountability for women's and children's health, Malawi is committed to implement those resolutions.

This strategy provides the vision, the action plan and the monitoring and evaluation framework for ehealth in Malawi. The eHealth Strategy is drawn from the Health Sector Strategic Plan (HSSP) 2011 – 2016 which is the main implementation tool for health service delivery in Malawi. The eHealth Strategy supports the four main outcomes of the HSSP by improving access to health services, improving care and strengthening monitoring and evaluation.

Situation Analysis

2.1 Health Situation

The population of Malawi grew from 9.9 million in 1998 to 13.1 million in 2008, representing an increase of 32 percent and a population growth rate of 2.8 percent per year. The population is thus expected to grow to 16.3 million by end of 2016. Population density increased from 105 persons per square kilometer in 1998 to 139 persons per square kilometer in 2008. Women represent 51% of the population, while 49% are men. 67% of the total population is under age 25, while 4% is age 65 or older.

The HSSP is the main health sector plan with the essential health package (EHP) as the main output, covering diseases and conditions affecting the majority of the population and especially the poor. This package has been delivered free of charge to Malawians and most of the interventions for EHP conditions have been cost effective. The conditions in this package are: vaccine preventable diseases; acute respiratory infections (ARIs); malaria; tuberculosis; sexually transmitted infections (STIs) including HIV/AIDS; diarrhoea; schistosomiasis; malnutrition; ear, nose and skin infections; perinatal conditions and common injuries.

Malawi has high immunization coverage. This is confirmed in the 2010 Demographic and Health Survey (DHS) report which shows that 81% of children aged 12-23 months were fully immunized although in 2010 the country experienced an outbreak of measles with an estimated 43,000 children requiring treatment. Between 2004 and 2010, the proportion of children with ARIs taken to a health facility for treatment increased from 19.6% to 70.3%. Malaria is another leading cause of morbidity and mortality in children under five years of age and pregnant women, caused mainly by low coverage of insecticide residual spraying (IRS), abuse of insecticide treated nets, low coverage of second dose of SP in pregnancy, unavailability of quality ACT in the private sector, and poor adherence to treatment guidelines and policies.

Dehydration from acute diarrhoea diseases is also one of the major causes of death in young children in Malawi. The prevalence of diarrhoea in Malawi is estimated at 17.5% with 38% in children of 6-12 months and only 324,000 treated out of 13 million expected episodes in 2010. The prevalence of diarrhoea and other disease outbreaks such as measles has a significant influence on nutritional status, resulting in high malnutrition rates, with 47% of children under five stunted and 20% severely stunted.

Maternal mortality rate decreased from 984 per 100,000 live births in 2004 to 675 per 100,000 in 2010 and women delivering at health centers increased from 57.2% in 2004 to 73% in 2010. However, it is estimated that only half of the births requiring emergency care receive the care and that sepsis and post-partum hemorrhage are the most likely causes of death in the majority of mortality cases based at health facilities. As of 2010, the neonatal mortality rate (NMR) was estimated at 33 deaths per 1,000 live births and it is higher in rural areas (34/1,000) compared to urban areas (30/1,000). The population projections for family planning using the 2008 census

data reinforce the importance of scaling up interventions to meet the MDG targets with the 2010 DHS report showing a significant unmet need for contraception and 73% of women wanting to delay pregnancy or having no more children.

The HSSP recognizes malaria, tuberculosis (TB), HIV and AIDS and STIs as the major communicable diseases. With regard to the TB, more cases are being detected and treatment failure is diminishing. As of 2010, TB treatment success rate was at 86% while case detection rate (46%) which is below the WHO target (70%). Sexually transmitted infections, including HIV and AIDS, consume the most resources on the MoH budget. Non communicable diseases (NCDs) are thought to be the second leading cause of deaths in adults after HIV and AIDS. The HSSP has therefore incorporated NCDs in the EHP, and interventions include screening for cervical cancer, hypertension and diabetes and providing treatment.

2.2   ICT in Health Situation

Ministry of Health introduced Health Information System (HIS) reform process in 1999 to improve the health care system. In 2002 the Health Management Information System (HMIS) was introduced across the country and the District Health Information Software (DHIS) was also introduced to manage data. In 2009 DHIS was upgraded to the web based version.

In September, 2013 the Malawi government passed the National ICT Policy. One of the priority areas of the policy is human capacity development through utilization of ICT to increase access to healthcare, education and training facilities. Through the eGovernment department, this policy has focus on ICT infrastructure development, ICT legal and regulatory framework, promotion of access to ICT and ICT-based services in the rural and under-served

communities, and the promotion of national ICT security. In terms of health sector, the policy has plains to implement the following:

(a) Network all healthcare institutions to collate information and share data;

(b) Provide full ICT access for healthcare professionals at all levels (primary, secondary and tertiary);

(c) Make ICT skills acquisition a requirement for all healthcare professionals and encourage on-line communication within the health sector;

(d) Encourage healthcare professionals to utilize ICT in their service;

(e) Develop and maintain a national electronic data depository to support the on-line national healthcare information, administration and management at primary, secondary and tertiary levels;

(f) Use ICT to provide medical education and support medical research in combating major national emerging and existing health threats such as TB, malaria and HIV and AIDS,;

(g) Establish and update a user-friendly national electronic Health Management Information System (eHMIS) across primary, secondary and tertiary healthcare systems;

(h) Create awareness of eHMIS in making health management decisions.

(i) Establish a database on health and nutrition information management, surveillance systems for HIV and AIDS;

(j) Establish systems for dissemination of information on nutrition and health, therapeutic feeding and treatment of opportunist infections like diarrhoea, malaria, TB and severe malnutrition; supplementary feeding to the malnourished people living with HIV and AIDS; ARVs treatment; prevention of mother to child transmission (PMTCT) of HIV;

(k) Establish databases on mitigation of the impact of AIDS such as orphans and elderly problems, absenteeism and staff turnover, household food insecurity, nutrition disorders and poverty;

(l) Establish systems for dietetics service delivery

In addition to the national ICT Policy, the MoH has recently finalized the development of a five year national Health Information Systems (HIS) strategy which is designed to achieve the following objectives :

(a) Create the necessary and enabling legal, policy and regulatory framework for NHIS

(b) Mobilize and increase resources for a financially sustainable NHIS

(c) Develop the necessary ICT infrastructure and the adoption and promotion of use of ICT in the health sector

(d) Strengthen the monitoring and evaluation within the health sector

(e) Enhance capacity and skills of NHIS staff at all levels

(f) Design and implement an integrated national HIS which includes health sector data from all sources, that is, not limited to health service delivery

(g) Improve availability, quality management and analysis of data and information at national and district levels

(h) Promote the dissemination of information and its utilization for decision making by stakeholders in the health sector

(i) Strengthen governance, partnership, collaboration and stakeholder participation at the national

level and

(j) Promote the implementation of a national vital statistics registry

Both the national ICT Policy and the MoH HIS strategy focus on improving the application of ICT in health service delivery.

Additionally, the MoH conducted an ehealth situation analysis focusing on the health service delivery institutions within the health sector. The assessment found that management of health records at facility level is mostly and primarily manual and this brings about challenges in rapid decision making, management of patient profiles and surveillance. Manual management of patient records also brings about difficulties in management of patient radiographs, laboratory samples and drug logistics. According to the assessment, referral lab samples are taking up to 21 days to get results.

Further, the study found that there are more than twenty patient record forms (registers) and more than thirty program specific reporting forms. It was also established through the study that guidelines for management of data are not standard across facilities with most facilities having no documented guidelines for data management. Only one mission hospital was found to be controlling access to health records using a biometric reader while the rest use lock and key. In terms of training, it was found that there is a gap in planning and offering of ICT related training. A recent report on DHIS 2 software supervision showed that there are no deliberate plans for ICT training in health facilities unless a project related software implementation provide one.

In general, the following challenges were observed with ICT in the health sector:
*   Lack of adequate ICT infrastructure,
*   Lack of maintenance for ICT equipment in health facilities, presence of multiple systems with no standards for integration and interoperability,
*   Lack of policies to support governance of the ICT infrastructure, major gaps in ICT knowledge and
*   Lack of sustainability strategies for implemented or proposed systems.

The ehealth situation assessment also got findings on the status of specific health information systems. For drug logistics, management of information in the pharmacy is manual using the stock cards. Efforts are under way to computerize the pharmacies so that information is managed electronically. For laboratory system, a project manager was recruited and a technical working group meets regularly to plan the implementation of a modern laboratory information system. Additionally, the process of implementing an integrated human resource management information system is in progress. There is also a presence of electronic medical records system at almost every district hospital, although with focus on specific departments and disease conditions. There are also mobile application initiatives implemented at community, hospital and national levels.

Ehealth opportunities include availability of the National ICT Policy, HIS Strategy, HMIS or DHIS

2, m-Health Projects, Telehealthcare initiatives, EMRs developed by partners like Baobab and Luke International Norway, and mobile projects being implemented at community, facility and national levels by partners such as John Snow Inc, D-Tree, Clinton Health Access Initiative to mention a few. Infrastructure opportunities are further available through the fixed line operators who are also providing limited mobile phone service. As of 2012, there were four million mobile phone subscribers at 99.55% land area signal coverage. At the same time, there were 75000 fixed telephone lines in both rural and urban areas. This means that the easiest mode of communication is the mobile phone with most people owning a basic feature phone with a capability only for the voice and SMS communications. The following channels of communication are available at varying degrees in health facilities: cell phone, telephone, email, Internet, video conferencing, voice-over-Internet protocol. Lack of power poses a major challenge in closing the digital divide between rural and urban communities. Although power is available in most urban areas, the major challenge is persistent blackouts which in some areas can last for days.

Vision, Mission, Goals and Key Guiding Principles

3.1 Vision

To have integrated proactive ehealth solutions that promote quality and productive lives in the health service delivery

3.2 Mission

To create an enabling environment for delivery of a comprehensive range of quality, equitable, cost effective and efficient health services using ehealth solutions in Malawi.

3.3 Goal

The main goal of the strategy is to strengthen the implementation of the HSSP through the use of ehealth solutions to increase access, availability and quality of health services.

3.4 Strategic Objectives

The strategy is designed to achiveve the following specific objectives:

(i) To implement a set of national ehealth foundations that provide a platform for health information exchange across geographic and health sector boundaries

(ii) To foster and accelerate the delivery of high priority ehealth solutions to healthcare providers at the national level.

(ii) To design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and health care providers

(iii) To develop a governance regime which allows strong coordination, visibility and oversight of national ehealth work program activities.

3.5   Key Principles

To address its vision, mission and goal effectively, the strategy will be guided by key principles, that is, fundamental values that will guide decision making by the MoH and its development partners. The principles are:

(1) National ownership and government leadership: The eHealth Strategy is a national health sector strategy for government with the MoH leading in the implementation.

(2) Human rights based approach and equity: ICTs shall be integrated in the health sector without distinction by ethnicity, gender, disability, religion, political belief, economic and social condition, geographical location of the target population or health service delivery unit with priority benefit to vulnerable members of the society.

(3) Embrace the basics right: Infrastructure, connectivity, basic ICT literacy, human resources, cost benefit analysis and return on investment (ROI), and governance frameworks including legal backing.

(4) Take an incremental approach: Build on existing foundations and innovations in both the public and private sectors and fill the gaps where necessary.

(5) Seek sustainable early gains: To build the confidence of health professionals, patients and the public in ehealth

(6) Advocate the benefits of care: Enabled by ehealth and ensure that the benefits are realized.

(7) Constantly evaluate ehealth initiatives and measure improvements: In health outcomes to build an evidence base that demonstrates the net benefits over time of ehealth and guides planning and decision making.

(8) Establish **national co-ordination** on all initiatives to improve the effectiveness of ehealth at all levels and specifically to
   (a)   enable integration between systems wherever appropriate,
   (b)   enforce common standards, norms and systems across the country,
   (c)   establish common data standards and terminology across information, systems and
   (d)   encourage a collaborative approach by leveraging **partnerships**, e.g. private sector, NGOs, other government departments and academic institutions.

(9)   Encourage implementation of scalable and sustainable ehealth solutions that are open source and easily adaptable

(10) Ensure confidentiality of consumer information

National eHealth Strategy

4.1 Strategic Work Streams

In order to achieve the vision, four major strategic streams of activity have been identified. These streams include foundations, ehealth solutions, change and adoption and governance. There is a very close relationship between each of the four strategic work streams. Hence their implementation need to be tightly coordinated and concurrently undertaken to deliver the national ehealth work program effectively.

4.2 Foundations Work Stream

The foundations work stream focuses on implementing the basic infrastructural building blocks required to enable effective electronic sharing of information across the Malawian health sector. To build the foundations for ehealth, five key areas need to be focused on: national ehealth information standards, computing infrastructure, national connectivity services, identification and authentication, reliable power supply and information protection.

The categories required for the national ehealth standards are: common terminologies through use of common language for describing symptoms, diagnoses and treatments; data representation standards and messaging standards. Computing infrastructure is one of the most basic foundations required for collecting, recording and sharing electronic information across the health sector. It consists of personal computing devices, network connectivity and core patient, clinical and practice management systems.

Objective (i): **To implement a set of national ehealth foundations that provide a platform for health information exchange across geographic and health sector boundaries**

4.2.1 National eHealth Information Standards (HIS Strategy 2.3.3)

Strategy 1: *Design and implement national ehealth information standards for data and message structures, coding and terminologies, health directory and product catalogue and information display*

Specific Actions

To establish the standards for ehealth, the following actions will be undertaken:

4.2.1.1   Develop, review and implement national health data dictionary

4.2.1.2   Review and implement national minimum (core) health data set for different   health programs

4.2.1.3   Update standards of clinical coding of disease conditions and laboratory examinations

4.2.1.4   Develop, review and implement health meta data dictionary

4.2.1.5   Develop and implement national health data collection and storage standards

4.2.1.6   Develop and implement national health data and information representation and display standards

4.2.1.7   Update and publish national unique identification codes for all levels of health service

providers

4.2.1.8 Accelerate endorsement and adoption of the existing ehealth standards through engagement with stakeholders

4.2.2 Computing Infrastructure (HIS Strategy 2.3.1)

Strategy 2: *Establish mechanisms to encourage care providers to invest in the implementation and maintenance of an acceptable baseline of computing infrastructure*

Specific Actions

To encourage care provider investment in computing infrastructure the following actions are to be undertaken:

4.2.2.1 Develop a national standardized ehealth computing infrastructure architecture.

4.2.2.2 Develop a national standardized minimum level of computing infrastructure for each level of health care provider

4.2.2.3 Identify sufficient funds to invest in the establishment of a national standardized minimum level of computing infrastructure. **(HIS Strategy 2.2.2)**

4.2.2.4 Develop and adopt a maintenance policy for each levels of health care providers' computing infrastructure. **(HIS Strategy 2.3.2)**

4.2.2.5 Link health care facility accreditation to national standardized minimum level of computing infrastructure investment

4.2.3 National Connectivity Services

Strategy 3: *Coordinate the construction and rollout of appropriate national connectivity services to all care providers*

Specific Actions

To coordinate the rollout of suitable national connectivity services to all care providers the following tasks will be undertaken:

4.2.3.1 Update and publish the Geographic Information System (GIS) coordinates for a l l levels of health care providers. For each facility provide details of GIS coordinates and signal strength of telecom providers or other nearest Internet Service Provider (ISP).

4.2.3.2 Design national ehealth connectivity architecture for all levels of health service providers. Disseminate the architecture to potential funding stakeholders including local development partners, Malawi Communications Regulatory Authority (MACRA), International Telecommunications Union, and Global System for Mobile Association (GSMA)

4.2.3.3 Engage and collaborate with communications authorities and service providers to extend the connectivity infrastructure coverage and capacity to make ehealth suitable connectivity services available to all health care providers based on the ehealth

connectivity architecture. Key stakeholders include MACRA, MoH, Airtel, Telecom Networks Malawi (TNM), Malawi Telecommunications Limited (MTL) to mention a few.

4.2.3.4.   Strengthen public private partnership between communications companies and health sector.

4.2.3.5   Negotiate initial and long term pricing arrangements for health care provider connectivity services that do not discourage their uptake and use for sharing health information.

4.2.3.6   Harmonize connectivity plans among stakeholders implementing ehealth solutions in health facilities.

4.2.4   Identification and Authentication

Strategy 4: *Implement a national solution to enable the unique identification of health service consumers*

Specific Actions
4.2.4.1   Strengthen the national health identification system to fulfill uniqueness requirements
4.2.4.2   Incorporate the national ID from the National Registration Bureau into the national health identification system **(HIS Strategy 2.10.1)**
4.2.4.3.   Support nationwide coverage of the national health identification system by the Ministry of Health

4.2.5 Reliable Power Supply

Strategy 5: *Coordinate construction and roll out of reliable power supplies to all healthcare providers for ehealth solution use.*

Specific Actions

4.2.5.1   Develop and implement a national standardized minimum power supply systems to each levels of health care providers. **(HIS Strategy 2.6.1)**
4.2.5.2   Develop and adopt a maintenance policy for each levels of care providers' power supply system.

4.2.6 Information Protection

Strategy 6: *Design and implement a consistent national framework for health information protection, privacy and consent*

Specific Actions

To establish an Information Protection regime the following actions will be undertaken:

4.2.6.1   Support the development of the health sector data policy.

4.2.6.2   Input into the Access to Information Bill and Malawi National Health Bill to ensure that issues of health data protection are included.

4.2.6.3   Work with regulatory bodies to standardize patient information management. This should include minimum requirements for health data protection

4.2.6.4   Raise awareness in consumers, care providers and health care managers of the regulatory frameworks and their implications for health information sharing and management.

4.3   E-Health Solutions Work Stream

The ehealth solutions work stream focuses on the national actions that are required to encourage the development and use of high priority ehealth systems that improve the efficiency and effectiveness of health service delivery. These ehealth solutions represent the tangible means by which consumers, care providers and health care managers will electronically interact with the health system. They include national priority ehealth solutions, telehealthcare, individual electronic health records and continuous professional development using e-learning.

Objective (ii): **To foster and accelerate the delivery of high priority ehealth solutions to healthcare providers in a nationally aligned *manner.***

4.3.1   National Priority eHealth Solutions (HIS Strategy 2.3.3)

Strategy 7*: Adopt a national coordinated approach to the development and implementation of ehealth solutions for priority areas.*

There is need to develop high priority ehealth solutions infrastructure with serious consideration to a national approach to implementation.

Specific Actions

4.3.1.1   Improve patient management at the OPD and Wards by ensuring that the Clinician, Physician, Order Entry (CPOE) for the OPD; and Admission, Discharge and Transfer (ADT) for the Ward are computerized for all high burden health facilities.

4.3.1.2   Review, design and implement electronic maternal, neonatal, child health information system

4.3.2.3   Strengthen the electronic Laboratory Information Management System (LIMS).

4.3.2.4   Strengthen the drug Logistics Management Information System (LMIS) through design and implementation of an electronic system.

4.3.4.5   Design and implement electronic dispensing system and inter-operate with the LMIS.

4.3.4.6   Review and scale up electronic HIV patient consultation system.

4.3.1.7   Design and implement electronic TB patient consultation system.

4.3.1.8   Review and scale up electronic NCDs patient consultation system.

4.3.1.9   Design and implement electronic mental health consultation system

4.3.1.10   Review and scale up electronic radiology management information system

4.3.1.11   Identify relevant national ehealth systems to be piloted in rural health facilities and communities (rural health centers, village clinics).

4.3.1.12   Scale-up the implementation of all relevant national ehealth systems to rural health facilities and communities.

4.3.1.13   Design and implement electronic central repository of both aggregate and patient level health data.

4.3.1.14   Establish national health portals to provide each group of stakeholders with a s i n g l e point of access for national coordinated and validated health care information (MoH website and portal).

4.3.2 Individual Electronic Health Records

Strategy 8: *Adopt an incremental and distributed approach to development of national individual electronic health records for tertiary hospitals and selected health programs*

Specific Actions

4.3.2.1   Connect care providers across the health care system so that they can effectively access and share consumer health information.

4.3.2.2   Enable the flow of priority sets of information between care providers which includes referrals, event summaries, prescriptions, test orders/results and care plans and
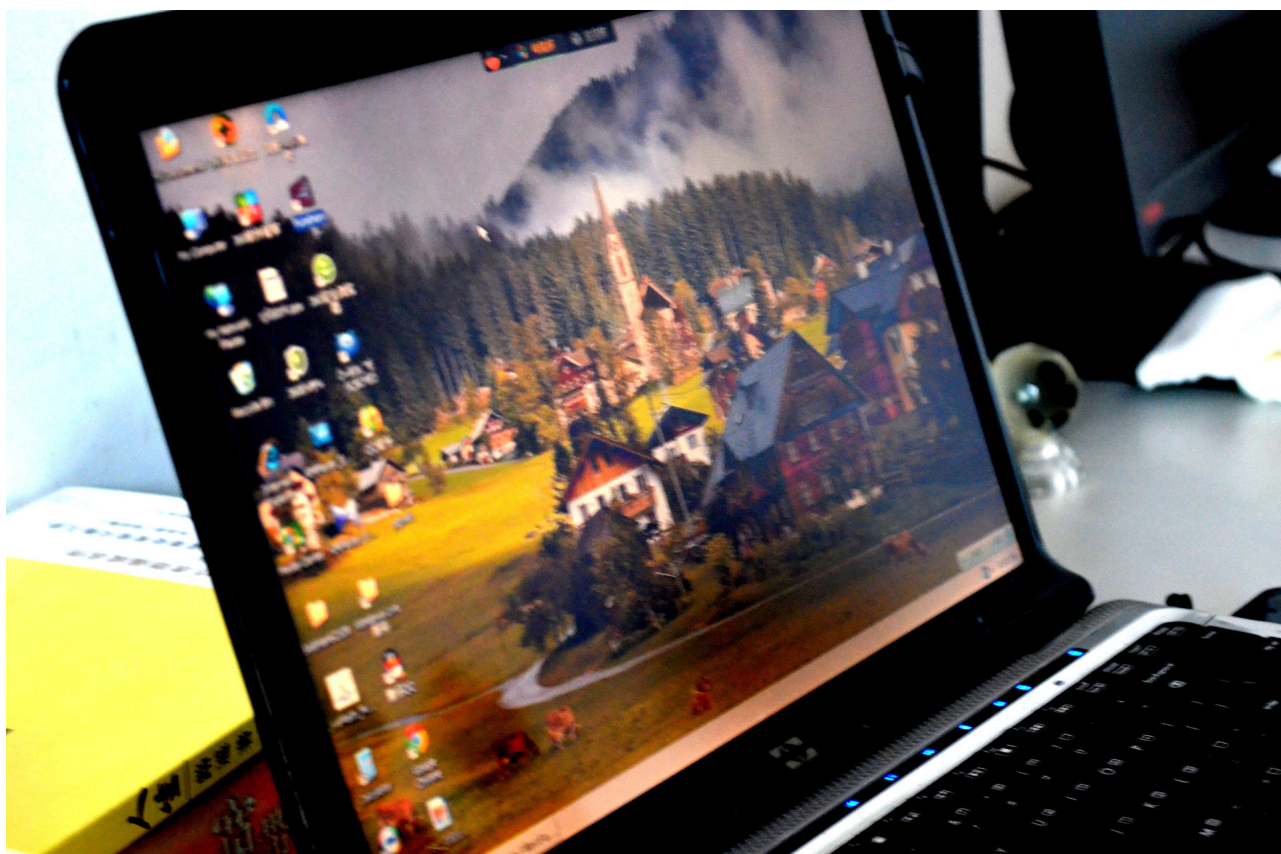
consumer data sets such as demographics, current health profiles and current medications lists.

4.3.3. Telehealthcare

Strategy 9*: Extend the services of skilled health care professionals through development and implementation of telehealthcare in pilot facilities at district and referral levels focusing on one particular condition*

Specific Actions

4.3.3.1   Develop a framework for telehealthcare to deliver health services through distance support of clinical reviews using a range of analogue, digital and mobile technologies, devices and sensors.

4.3.3.2   Implement telehealthcare solution where technology such as email, telephone, telemetry, video conferencing, digital imaging, web and digital television are used to support clinical consultations between professional to professional, clinicians and patients, or between groups of clinicians.

4.3.4   Continuous Professional Development using E-learning (HIS Strategy 2.5.2)

Strategy 10: *Leverage in e-learning methodology to support continuous professional development of health care workers*

Specific Actions:
4.3.4.1   Facilitate development of skills for both learners and educators, to embed e-learning in learning and teaching.
4.3.4.2   Constitute a working group to identify and prioritize professional development areas in health sector to be supported through e-learning.
4.3.4.3   Identify and prioritize professional development areas to be supported through e-learning.
4.3.4.4   Collaborate with training and academic institutions to design and implement delivery platforms and learning systems such as Virtual Learning Environments (VLEs), repositories, learning management systems.
4.3.3.5   Collaborate with training institutions to develop and upload learning content, including online resources, courses and learning objects.
4.3.4.6   Collaborate with training institutions to deliver and assess the e-learning programs to health care workers.

4.4 Change and Adoption Work Stream

The change and adoption work stream focuses on what needs to be done to encourage and enable stakeholders in the health care system to adopt ehealth solutions and to change their work practices to be able to use them effectively. The aim of this work stream is to enact national

strategies to drive the adoption of ehealth in Malawi to a self-sustaining ticking point as quickly as possible.

Objective (iii): **To design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers.**

4.4.1. Awareness campaigns

Strategy 11: *Design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers.*

Specific Actions

The design and implementation of national awareness campaigns will require the following activities to be undertaken:

4.4.1.1 Identify key consumer, care provider and health care manager stakeholder segments that should be targeted for ehealth adoption and assess their readiness to adopt specific ehealth solutions and the opportunities to build momentum.

4.4.1.2 Develop and implement awareness campaigns utilizing appropriate communications mechanisms and forums to promote awareness of ehealth solutions and their benefits.

4.4.1.3 Evaluate the effectiveness of engagement and awareness activities by periodically measuring progress against the targets defined for the advancement of ehealth adoption across consumers, care providers and health care managers.

4.4.1.4 Support awareness campaigns with a national, web-based knowledge repository that captures ehealth project successes and enables the sharing of learning across the health care community.

4.4.2. Education and Training (HIS Strategy 2.5.2)

Strategy 12: *Implement changes to vocational and tertiary training programs to increase the number of skilled, nationally available ehealth practitioners.*

Specific Actions

The establishment of an appropriate ehealth workforce will require the following actions to be undertaken:

4.4.2.1. Define a standardized ehealth competency framework for health workers and health ICT practitioners providing an understanding of required ehealth knowledge, skills and attributes for each professional group with certification system.

4.4.2.2.   Determine the education and training course changes required to ensure the development of ehealth workforce capabilities.

4.4.2.3.   Work with post-secondary educational institutions such as universities, vocational training institutions and professional bodies to embed ehealth into their curricula.

4.4.2.4.   Assess the current state of health informatics in Malawi and consult with relevant academics and health informatics practitioners both in private and public sector to understand their requirements.

4.4.2.5.   Establish a nationally recognized tertiary qualification in health informatics and implement formalized training or education programs designed to recognize and promote the spread of the specialist skill.

4.4.2.6.   Conduct awareness campaign to strengthen change of attitude of care providers to ensure documentation of consumer information at all times and at all contact points.

4.5   Governance Work Stream

Successful implementation of the eHealth Strategy requires a solid governance framework to ensure coordination, funding prioritization and oversight of national ehealth work program activities. There is need to review constantly the progress of implementation and reporting to both senior MoH management and interest stakeholders such as development partners. Leveraging existing systems is key to ensuring a functional structure without major disturbance to the existing management structure.

Objective (iv): **To develop governance regime which allows strong coordination, visibility and oversight of national ehealth work program activities.**

4.5.1. Stakeholder Consultation Forums and Working Groups (HIS Strategy 2.9.2)

Strategy 13:   *Sustain national ehealth stakeholder consultation forums and working groups with cross sectoral representation*.

Specific Actions

In order to sustain stakeholder consultation forums, the following actions shall be undertaken:

4.5.1.1.   Coordinate regular meetings for both National Data Standards Sub Technical Working Group and m-Health Sub Technical Working Group.

4.5.1.2   Align MoH ehealth requirements with these meetings so that adequate consultations do take place on each requirement.

4.5.1.3   Identify funds to enable the consultation forums to meet regularly.

4.5.1.4   Encourage key implementation partners such as eGovernment, Economic Planning and Development (EP&D), Accountant General, and MACRA to be well represented in MoH consultation forums especially Monitoring and Evaluation Technical Working

Group (M&E TWG).

4.5.2. Establish and formalize eHealth Strategy steering committee

Strategy 14: *Establish and formalize a high level committee comprising key stakeholders from the health sector to oversee the implementation of the eHealth Strategy*

Specific Actions

The following needs to be done to establish and formalize the oversight committee:

4.5.2.1   Develop and adopt terms of reference for the ehealth strategy oversight committee

4.5.2.2.   Establish within the Health Sector Wide Approach a reporting line for the committee

4.5.2.3.   Identify members and constitute the committee

4.5.2.4.   Ensure that regular meetings for the committee do take place

E-Health Strategy Implementation, Monitoring and Evaluation

5.1   Implementation

The eHealth Strategy is to be implemented in support of the Health Sector Strategic Plan which runs up to 2016. The period for implementing the activities of this strategy has therefore been aligned with the period of the HSSP and the ehealth strategy will therefore be implemented up to 2016. The cost of implementing the strategy is estimated at **$20, 129, 069.50.** Since it may not be possible to raise all this money at once each year, the annual work plan for the MoH will prioritize activities to be done in fulfillment of the strategy.

The implementation of the eHealth Strategy will be supported by three sets of institutional structures to ensure the success. These are presented below.

5.1.1   eHealth Strategy Secretariat

The Central Monitoring and Evaluation Division (CMED) in the Department of Planning and Policy Development has been identified as the secretariat to coordinate and to lead in the implementation of this strategy. CMED is headed by the Deputy Director of Planning and Policy Development. The secretariat will work under the leadership of Deputy Director of Planning and Policy Development responsible for CMED and will be reporting to the Director of Planning and Policy Development. The secretariat will work closely with the Steering Committee and the Monitoring and Evaluation Technical Working Group.

5.1.2   eHealth Strategy Steering Committee

Lead by the Director of Planning and Policy Development, the eHealth Strategy Steering Committee shall comprise the Director and all Deputy Directors in the Department of Planning and Policy Development, a representative from the ICT section, all departmental Directors and the Head of SWAp in the Ministry of Health. This committee will meet semiannually to oversee the implementation of the strategic plan. In exceptional cases, the committee will constitute *ad hoc* meetings as need arises. The Steering Committee shall be responsible for decision making and providing guidance on policy related issues affecting the implementation of the plan. The secretariat will facilitate the eHealth Strategy steering committee meetings.

5.1.3   Monitoring and Evaluation Technical Working Group

The eHealth Strategy secretariat shall consult with stakeholders, including development partners, on prioritization and implementation of activities in the strategy through the M&E Technical Working Group (TWG). Specific issues will be addressed at technical level through the sub groups of the M&E TWG which include the National Data Standards sub TWG, the m-Health sub TWG and the Equity and Access sub TWG. Policy recommendations from the M&E TWGs shall be presented to the steering committee during its semiannual meetings.

5.2 Monitoring and Evaluation

The tables below provide the outputs for each objective.

5.2.1 Strategies for Foundation Work Stream

Objective (i): **To implement a set of national ehealth foundations that provide a platform for health information exchange across geographic and health sector boundaries**

Focus Area: **National ehealth information standards**

Strategy 1: *Design and implement national ehealth information standards for data and message structures, coding and terminologies, health directory and product catalogue and information display*

Activities	Output (s)/Target	Responsible
(1) Develop, review and implement national health data dictionary	National health data dictionary	CMED
(2) Review and implement national minimum (core) health data set for different health programs	Minimum health data sets (All programs)	CMED
(3) Update standards of clinical coding of disease conditions and laboratory examinations	Clinical codes list (1)	CMED, Diagnostics
(4) Develop, review and implement health meta data dictionary	Health meta data dictionary (1)	CMED
(5) Develop and implement national health data collection and storage standards (standardize data collection and storage infrastructure for each levels of health care facilities or providers)	A document of health data collection and storage standards (1)	CMED
(6) Develop and implement national health data and information representation and display standards	A document of health data and information representation and display standards (1)	CMED
(7) Update and publish national unique identification codes for all levels of health service providers	A list of unique identification codes for health facilities. List published on MoH portal (1). List of health facility codes(1). MoH web portal	CMED
(8) Accelerate endorsement and adoption of these existing ehealth standards through engagement with stakeholders	Dissemination through MoH portal and presentation of each standards document to M&E TWG, MoH management and other stakeholders (1 presentation made for each)	CMED, IT Section

Focus Area: **Computing Infrastructure**

Strategy 2:   *Establish mechanisms to encourage the health sector to invest in the implementation and maintenance of national standardized minimum level of computing infrastructure*

Activities	Output (s)/Target	Responsible
(1) Develop a national standardized ehealth computing infrastructure architecture	Computing infrastructure architecture document (1)	CMED, IT Section, eGovt
(2) Develop a national standardized minimum level of computing infrastructure for each level of health care provider	Standardized minimum level of computing infrastructure document (1)	CMED, IT Section, eGovt
(3) Identify sufficient funds to invest in the establishment of a national standardized minimum level of computing infrastructure	Availability of funds (1)	CMED, IT Section, eGovt
(4) Develop and adopt a maintenance policy for each levels of health care providers' computing infrastructure	ICT maintenance policy (1)	CMED, IT Section
(5) Link health care facility accreditation to national standardized minimum level of computing infrastructure investment	Inclusion of minimum level of computing infrastructure into accreditation guidelines for regulatory bodies (1)	CMED, DPPD

Focus Area: **National Connectivity**

Strategy 3:   *Coordinate the construction and rollout of appropriate national connectivity services to all care providers*

Activities	Output (s)/Target	Responsible
(1) Update and publish the GIS coordinates for all levels of health care providers. For each facility, provide details of GIS coordinates and signal strength of telecom providers or other nearest Internet Service Provider.	List of GIS coordinates and corresponding telecom signal strength for all levels of health care providers. (1 List)	CMED
(2) Design national ehealth connectivity architecture for all levels of health service providers. Disseminate the architecture to potential funding stakeholders including local development partners, Malawi Communications Regulatory Authority, International Telecommunications Union, and GSME.	National ehealth connectivity architecture document (1 Document)	CMED, IT Section, eGovt

Activities	Output (s)	Responsible
(3) Engage and collaborate with communications authorities and service providers to extend the connectivity infrastructure coverage and capacity to make ehealth suitable connectivity services available to all health care providers based on the ehealth connectivity architecture. Key stakeholders are: MACRA, MoH, Airtel, TNM, MTL and other mobile telephone providers	Meetings with stakeholders on extending connectivity (3 meetings)	CMED, IT Section, eGovt
(4) Strengthen public private partnership between communications companies and health sector	Stakeholder brainstorming meetings on possible PPP models (3 meetings)	CMED, IT Section, eGovt
(5) Negotiate initial and long term pricing arrangements for health care provider connectivity services that do not discourage their uptake and use for sharing health information	Stakeholder meetings on pricing arrangements (3 meetings)	CMED
(6) Harmonize connectivity plans among stakeholders implementing ehealth solutions in health facilities	Stakeholder meetings, Integrated connectivity plans (3 meetings, 1 connectivity plan document)	CMED

Focus Area: **Identification and Authentication**

Strategy 4: *Implement a national solution to enable the unique identification of health service consumers*

Activities	Output (s)	Responsible
(1) Strengthen the national health identification system to fulfill uniqueness requirements	Unique national health identification system (1 identification system)	CMED
(2) Incorporate the national ID from the National Registration Bureau into the national health identification system	National ID integrated with the Unique national health identifier (Completed Integration)	CMED, NRB
(3) Support nationwide coverage of the national health identification system by the Ministry of Health	Unique national health ID rolled out (30% of government facilities)	CMED

Focus Area: **Reliable Power Supply**

Strategy 5: *Coordinate construction and roll out of reliable power supplies to all healthcare providers for ehealth solution use*

Activities	Output (s)	Responsible
(1) Develop a national standardized minimum power supply systems to each levels of health care providers.	Standard specifications for minimum power systems (1 specification document)	CMED
(2) Develop and adopt a maintenance policy for each levels of care providers power supply system	Power Supply System Maintenance Policy (1 maintenance policy document)	CMED

Focus Area: **Information Protection**

Strategy 6: *Design and implement a consistent national legislative framework for health information protection, privacy and consent*

Activities	Output (s)	Responsible
(1) Support the development of the health sector data policy	Health Sector Data Policy (1 Data Policy Document)	CMED, IT Section
(2) Input into the Access to Information Bill and Malawi National Health Bill to ensure that issues of health data protection are included	Written presentation of issues to be included in the bills to the Director of Planning and Policy Development (1 issues document)	CMED, DPPD
(3) Work with regulatory bodies to standardize patient information management. This should include minimum requirements for health data protection.	Guideline document for patient information management (1 document)	CMED, DPPD
(4) Raise awareness in consumers, care providers and health care managers of the regulatory frameworks and their implications for health information sharing and management	Health Data Protection Awareness Campaign through Health Education Unit (1 Campaign Completed)	HEU, CMED

5.2.2. Strategies for ehealth Solutions Work Stream

Objective(ii): **To foster and accelerate the delivery of high priority ehealth solutions to healthcare providers in a nationally aligned manner.**

Focus Area: **National Priority eHealth Solutions**

Strategy 7: *Adopt a national coordinated approach to the development and implementation of ehealth solutions for priority areas*

Activities	Output (s)	Responsible
(1) Improve patient management at the OPD and wards by ensuring that the Clinician, Physician, Order Entry (CPOE) for the OPD and Admission, Discharge and Transfer (ADT) for the ward are computerized for all high burden health facilities.	CPOE & ADT Systems, Roll out of systems to health facilities (30% of facilities to have system implemented)	CMED, Clinical
(2) Review, design and implement electronic maternal, neonatal, child health information system	Electronic maternal, neonatal, child health information system implemented in facilities (30 sites - all district and referral hospitals)	CMED, RHU
(3) Strengthen the electronic Laboratory Information Management System (LIMS)	LIMS system, implementation in health facilities (30 sites - all district and referral hospitals)	CMED, HTSS
(4) Strengthen the drug Logistics Management Information System (LMIS) through design and implementation of an electronic system.	LMIS, implementation in health facilities (30 sites - all district and referral hospitals)	CMED, HTSS
(5) Design and implement electronic dispensing system and inter-operate with the LMIS.	Pharmaceutical electronic Dispensing System (30 sites - all district and referral hospitals)	CMED, HTSS
(6) Review, update and scale up electronic HIV patient consultation system	Scale up of electronic HIV Patient Consultation System (New 34 sites)	CMED, HIV/AIDS
(7) Design and implement electronic TB patient consultation system	TB Patient Consultation System (34 sites - including all district and referral hospitals).	CMED, TB
(8) Design and implement electronic NCDs patient consultation system	NCDs Patient Consultation Module (34 sites)	CMED, NCDs
(9) Design and implement electronic mental health consultation system	Electronic mental health consultation system deployed in facilities (5 sites - including all district and referral hospitals).	CMED, NCDs
(10) Review and scale up electronic radiology management information system	Radiology Management Information System implemented in referral hospital	CMED, Diagnostics, Clinical
(11) Identify relevant national systems to be piloted in rural health facilities and communities (rural health centers, village clinics)	List of systems to be piloted. Piloting of systems. (1 List of systems)	CMED
(12) Scale-up the implementation of all relevant national systems to rural health facilities and communities	Implementation of piloted systems (Scale up of prioritized systems)	CMED
(13) Design and implement electronic central repository of both aggregate and patient level health data	Health data central repository (1 aggregate data repository, 1 patient level repository)	CMED

Activities	Output (s)	Responsible
(14) Establish national health portals to provide each group of stakeholders with a single point of access for national coordinated and validated health care information (MoH website and Portal).	MoH website and portal	IT Section, CMED

Focus Area: Individual Electronic Health Records

Strategy 8: *Adopt an incremental and distributed approach to development of national individual electronic health records for tertiary hospitals and selected health programs*

Activities	Output (s)	Responsible
(1) Connect care providers across the health care system so that they can effectively access and share consumer health information	Connectivity to all sites having an electronic health data management system (30% of government health facilities)	CMED, IT Section
(2) Enable the flow of priority sets of information between care providers which includes referrals, event summaries, prescriptions, test orders or results, care plans and consumer data sets such as demographics, current health profiles and current medications lists	Health System Information Exchange (4 Referral Hospitals)	CMED, IT Section

Focus Area: Telehealthcare

Strategy 9: *Extend the services of skilled health care professionals through development and implementation of telehealthcare in pilot facilities at district and referral levels focusing on one particular condition.*

Activities	Output (s)	Responsible
(1) Develop a framework for telehealthcare to deliver health services through distance support of clinical reviews using a range of analogue, digital and mobile technologies, devices and sensors.	Telehealthcare Framework Document (1)	CMED, IT Section
(2) Implement telehealthcare solution where technology such as email, telephone, telemetry, video conferencing, digital imaging, web and digital television are used to support clinical consultations between professional to professional, clinicians and patients, or between groups of clinicians.	Telehealthcare Pilot Implementation for 1 Central Hospital, 1 District Hospital and 1 Health Center	CMED, IT Section

Focus Area: **Continuous Professional Development using E-Learning**

Strategy 10: *Leverage e-learning methodology to support continuous professional development of health care workers*

Activities	Output (s)/Target	Responsible
(1) Constitute a working group to identify and prioritize professional development areas in health sector to be supported through e-learning	Work Group on professional skills to be supported through e-learning	CMED, HRD
(2) Identify and prioritize professional development areas to be supported through e-learning	List of professional areas to be supported through e-learning	HRD, CMED
(3) Collaborate with training and academic institutions to design and implement delivery platforms and learning systems such as Virtual Learning Environments (VLEs), repositories, learning management systems.	E-Learning delivery platforms and Learning Systems	CMED, HRD
(4) Collaborate with training institutions to develop and upload learning content, including online resources, courses and learning objects.	E-learning content	CMED
(5) Collaborate with training institutions to deliver and assess the e-learning programs to health care workers	Delivery of e-learning programs	CMED, HRD

5.2.3 Strategies for Change and Adoption Work Stream

Objective (iii): **To design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers**

Focus Area: **Awareness campaigns**

Strategy 11: *Design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers*

Activities	Output (s)/Target	Responsible
(1) Identify key consumer, care provider and health care manager stakeholder segments that should be targeted for ehealth adoption and assess their readiness to adopt specific ehealth solutions and the opportunities to build momentum.	Targeted list for ehealth adoption	CMED
(2) Develop and implement awareness campaigns utilizing appropriate communications mechanisms and forums to promote awareness of ehealth solutions and their benefits	Awareness campaigns covering targeted population	HEU, CMED

Activities	Output (s) / Target	Responsible
(3) Evaluate the effectiveness of engagement and awareness activities by periodically measuring progress against the targets defined for the advancement of ehealth adoption across consumers, care providers and health care managers	Awareness campaign assessments (per year)	CMED
(4) Support awareness campaigns with a national, web-based knowledge repository that captures ehealth project successes and enables the sharing of learning across the health care community.	Updated web based knowledge repository listing ehealth successes	IT Section

Focus Area: **Education and Training**

Strategy 12:   *Implement changes to vocational and tertiary training programs to increase the number of skilled, nationally available ehealth practitioners.*

Activities	Output (s) / Target	Responsible
(1) Define a standardized ehealth competency framework for health workers and health IT practitioners providing an understanding of required ehealth knowledge, skills and attributes for each professional group with certification system	Ehealth competency framework	HRD
(2) Determine the education and training course changes required to ensure the development of ehealth workforce capabilities	List of requirements required to develop ehealth	HRD
(3) Work with post-secondary educational institutions such as universities, vocational training institutions and professional bodies to embed ehealth into their curricula	Established collaboration with training institutions, meetings	HRD, CMED
(4) Asses the current state of health informatics in Malawi and consult with relevant academics and health informatics practitioners (private and public sector) to understand industry and sector requirements	Health informatics assessment report	CMED, HRD
(5) Establish a nationally recognized tertiary qualification in health informatics and implement formalized training or education programs designed to recognize and promote the growth of the specialist skill	Accredited tertiary qualification in health informatics	CMED, HRD
(6) Conduct awareness campaign to strengthen change of attitude of care providers to ensure documentation of consumer information at all times and at all contact points.	Awareness campaign conducted (80% of care providers reached)	HEU, CMED

5.2.4 Strategies for Governance Work Stream

Objective (iv) **Develop a governance regime which allows strong coordination, visibility and oversight of national Ehealth work program activities.**

Focus Area: **Stakeholder Consultation Forums and Working Groups**

Strategy 13: *Sustain national ehealth stakeholder consultation forums and working groups with cross sectoral representation*

Activities	Output (s) / Target	Responsible
(1) Coordinate regular meetings for both National Data Standards Sub Technical Working Group and m-Health Sub Technical Working Group.	Regular meetings (4 per year for each sub TWG)	CMED
(2) Align MoH ehealth requirements with these meetings so that adequate consultations do take place on each requirement.	Inclusion of MoH ehealth requirements on sub TWG agendas	CMED
(3) Identify funds to enable the consultation forums to meet regularly.	Availability of finances to support convening of meetings	CMED
(4) Encourage key implementation partners such as eGovernment, EP&D, Accountant General, and MACRA to be well represented in MoH consultation forums especially in M&E TWGs	Presence of key stakeholder representatives at all meetings	CMED

Focus Area: **eHealth Strategy Steering Committee**

Strategy 14: *Establish and formalize a high level committee comprising key stakeholders from the health sector to oversee the implementation of the ehealth strategy*

Activities	Output (s) / Target	Responsible
(1) Develop and adopt terms of reference for the eHealth Strategy oversight committee	Steering committee ToRs	DPPD, CMED
(2) Establish within the Health Sector Wide Approach a reporting line for the committee	Clear reporting line of committee under health Sector Wide Approach (SWAp)	SWAp
(3) Identify members and constitute the committee	List of committee members	DPPD
(4) Ensure that regular meetings for the committee do take place	Regular bi-annual committee meetings	CMED

Budget: $20, 129, 069.50

Focus Area	Strategy	Qty	Cost Estimate (US $)
National eHealth Information Standards	**Design and implement national ehealth information standards for data and message structures, coding and terminologies, health directory and product catalogue and information display**		
	(1) Develop, review and implement national health data dictionary	1	11, 437.50
	(2) Review and implement national minimum (core) health data set for different health programs	1	6, 407.50
	(3) Develop, review and implement health meta data dictionary	1	4, 300.00
	(4) Develop and implement national health data collection and storage standards (standardized data collection and storage infrastructure for each levels of health care facilities/providers)	1	4, 300.00
	(5) Develop and implement national health data and information exchange with secure messaging standards	1	19, 400.00
	(6) Accelerate endorsement and adoption of these existing ehealth standards through engagement with stakeholders		2, 000.00
Computing Infrastructure			
	Establish mechanisms to encourage political will in the health sector to invest in the implementation and maintenance of national standardized minimum level of computing infrastructure		
	(1) Develop a national standardized minimum level of computing infrastructure for each level of health care provider		4, 300.00
	(2) Develop a national standardized minimum level of computing infrastructure for each level of health care provider		13, 837.00
	(3) Identify sufficient funds to invest in the establishment of a national standardized minimum level of computing infrastructure		1, 000.00
	(4) Develop and adopt a maintenance policy for each levels of health care providers' computing infrastructure		15, 650.00
	(5) Link health care facility accreditation to national standardized minimum level of computing infrastructure investment (Medical Council)		5, 000.00

Focus Area	Strategy	Qty	Cost Estimate (US $)
National Connectivity Services	**Coordinate the construction and rollout of appropriate national connectivity services to all care providers**		
	(1) Update and publish the GIS coordinates for all levels of health care providers. (Facility locations and signal strength using standardized tool)		27, 000.00
	(2) Design national ehealth connectivity architecture for all levels of health service providers. Disseminate the architecture to stakeholders including local development partners, ITU, and GSME.		17, 000.00
	(3) Engage and collaborate with communications authorities and service providers to extend the connectivity infrastructure coverage and capacity to make ehealth suitable connectivity services available to all health care providers. (MACRA, MoH, Airtel, TNM, MTL etc) based on the ehealth connectivity architecture.		10, 000.00
	(4) Strengthen public private partnership between communications companies and health sector		5, 000.00
	(5) Negotiate initial and long term pricing arrangements for health care provider connectivity services that do not discourage their uptake and use for sharing health information.		25, 000.00
	(6) To harmonize connectivity plans among stakeholders implementing ehealth solutions in health facilities		
Universal Health Identification	**Implement a national solution to enable the unique identification of health service consumers - Implement the unique health identifier service**		
	(1) Strengthen the national health identification system to fulfill uniqueness requirements		7, 750.00
	(2) Incorporate the national ID from the National Registration Bureau into the national health identification system		
	(3) Support nationwide coverage of the national health identification system by the Ministry of Health		217, 000.00

Focus Area	Strategy	Qty	Cost Estimate (US $)
Reliable Power Supply	**Coordinate construction and roll out of reliable power supplies to all healthcare providers for ehealth solution use**		
	(1) Develop a national standardized minimum power supply systems to each levels of health care providers.		5, 000.00
	(2) Develop and adopt a maintenance policy for each levels of care providers power supply system		8, 000.00
Information Protection			
	Design and implement a consistent national legislative framework for health information protection, privacy and consent		
	(1) Support the development of the health sector data policy		36, 687.50
	(2) Work with regulatory bodies to standardize patient information management. This should include minimum requirements for health data protection.		3, 000.00
	(3) Raise awareness in consumers, care providers and health care managers of the regulatory frameworks and their implications for health information sharing and management		5, 000.00
National Priority eHealth Solutions			
	Adopt a national coordinated approach to the development and implementation of eHealth solutions for priority areas.		
	(1) Improve patient management at the OPD and wards by ensuring that the Clinician, Physician, Order Entry (CPOE) for the OPD and Admission, Discharge and Transfer (ADT) for the Ward are computerized for all health facilities that have at least 500 patients' visits per day.		3, 300, 000.00
	(2) Design and implement the laboratory information management system		2, 500, 000.00
	(3) Pharceutical inventory control system (ePICS), HIV Patient Consultation Module, TB Patient Consultation Module, NCDs Patient Consultation Module, Radiology management information system, drug Logistics management information system (LMIS)		12, 000, 000.00
	(4) Design and implement a central repository of health data		41, 000.00
	(5) Establish national health portals to provide each group of stakeholders with a single point of access for national coordinated and validated health care information. (MoH Website and Portal)		55, 000.00

Focus Area	Strategy	Qty	Cost Estimate (US $)
Individual Electronic Health Records	**Adopt an incremental and distributed approach to development of national individual electronic health records for tertiary hospitals and selected health programs**		
	(1) Connect care providers across the health care system so that they can effectively access and share consumer health information		40, 000.00
	(2) Enable the exchange and sharing of priority sets of information between care providers which includes referrals, event summaries, problem list, prescriptions, test orders or results and care plans and consumer data sets such as demographics, current health profiles and current medications lists for longitudinal patient care and referrals		105, 000.00
Telehealthcare	**Extend the services of skilled health care professionals through development and implementation of telehealthcare in pilot facilities at district and referral levels focusing on one particular condition**		
	(1) Develop a framework for telehealth to deliver health services through distant support of clinical reviews using a range of analogue, digital and mobile technologies, devices and sensors.		10, 000.00
	(2) Implement telehealth solution where technology such as email, telephone, telemetry, video conferencing, digital imaging, web and digital television are used to support clinical consultations between professional to professional, clinicians and patients, or between groups of clinicians		28, 000.00
Continuous Professional Development	Leverage in e-learning methodology to support continuous professional development of health care workers		1, 500, 000.00
Awareness campaigns	Design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers		36, 000.00
Education and Training	Implement changes to vocational and tertiary training programs to increase the number of skilled and nationally available ehealth practitioners.		60, 000.00
Stakeholder consultation forums	Sustain national ehealth stakeholder consultation forums and working groups with cross sectoral representation		136, 800.00

Appendix

Strategy 1: *Design and implement national ehealth information standards for data and message structures, coding and terminologies, health directory and product catalogue and information display*

Focus Area: **Computing Infrastructure**

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Develop a national standardized ehealth computing infrastructure architecture	█											
(2) Develop a national standardized minimum level of computing infrastructure for each level of health care provider		█										
(3) Identify sufficient funds to invest in the establishment of a national standardized minimum level of computing infrastructure			█	█	█	█	█	█	█	█	█	█
(4) Develop and adopt a maintenance policy for each levels of health care providers' computing infrastructure			█									
(5) Link health care facility accreditation to national standardized minimum level of computing infrastructure investment				█	█	█	█	█	█	█	█	█

Strategy 2: *Establish mechanisms to encourage the health sector to invest in the implementation and maintenance of national standardized minimum level of computing infrastructure*

Focus Area: **National Connectivity Services**

Strategy 3: *Coordinate the construction and rollout of appropriate national connectivity services to all care providers*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Update and publish the GIS coordinates for all levels of health care providers. For each facility provide details of GIS coordinates and signal strength of telecom providers or other nearest ISP.	■	■					■				■	
(2) Design national ehealth connectivity architecture for all levels of health service providers. Disseminate the architecture to potential funding stakeholders including local development partners, Malawi Communications Regulatory Authority, International Telecommunications Union, and GSMA.	■	■										
(3) Engage and collaborate with communications authorities and service providers to extend the connectivity infrastructure coverage and capacity to make ehealth suitable connectivity services available to all health care providers based on the ehealth connectivity architecture. Key stakeholders are: MACRA, MoH, Airtel, TNM, MTL, etc.			■									
(4) Strengthen public private partnership between communications companies and health sector	■	■	■	■	■	■	■	■	■	■	■	■
(5) Negotiate initial and long term pricing arrangements for health care provider connectivity services that do not discourage their uptake and use for sharing health information.			■									
(6) Harmonize connectivity plans among stakeholders implementing ehealth solutions in health facilities				■								

Focus Area: **Identification and Authentication**

Strategy 4:   *Implement a national solution to enable the unique identification of health service consumers*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Strengthen the national health identification system to fulfill uniqueness requirements	■	■	■	■								
(2) Incorporate the national ID from the National Registration Bureau into the national health identification system			■	■	■	■	■	■	■	■	■	■
(3) Support nationwide coverage of the national health identification system by the Ministry of Health			■	■	■	■	■	■	■	■	■	■

Focus Area: **Reliable Power Supply**

Strategy 5:   *Coordinate construction and roll out of reliable power supplies to all healthcare providers for ehealth solution use*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Develop national standardized minimum power supply systems to each levels of health care providers.		■										
(2) Develop and adopt a maintenance policy for each levels of care providers power supply system		■										

Focus Area: **Information Protection**

Strategy 6:   *Design and implement a consistent national legislative framework for health information protection, privacy and consent*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Support the development of the health sector data policy	▓	▓										
(2) Input into the Access to Information Bill and Malawi National Health Bill to ensure that issues of health data protection are included	▓	▓	▓	▓								
(3) Work with regulatory bodies to standardize patient info management. This to include minimum requirements for health data protection.			▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
(4) Raise awareness in consumers, care providers and health care managers of the regulatory frameworks and their implications for health information sharing and management			▓	▓	▓	▓	▓	▓	▓	▓	▓	▓

Strategies for ehealth Solutions Work Stream

Objective (ii): **To foster and accelerate the delivery of high priority ehealth solutions to healthcare providers in a nationally aligned manner.**

Focus Area: **National Priority eHealth Solutions**

Strategy 7: *Adopt a national coordinated approach to the development and implementation of ehealth solutions for priority areas.*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Improve patient management at the OPD and Wards by ensuring that the Clinician, Physician, Order Entry (CPOE) for the OPD; and Admission, Discharge and Transfer (ADT) for the Ward are computerized for all high burden health facilities.	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(2) Review, design and implement electronic maternal, neonatal, child health information system	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(3) Strengthen the electronic Laboratory Info Management System (LIMS).	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(4) Strengthen the drug Logistics Management Info System (LMIS) through design and implementation of an electronic system.	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(5) Design and implement electronic dispensing system and inter-operate with the LMIS.	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(6) Review, update and scale up electronic HIV patient consultation system	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(7) Design and implement electronic TB patient consultation system	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(8) Design and implement electronic NCDs patient consultation system	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(9) Review and scale up electronic radiology management information system	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(10) Identify relevant national systems to be piloted in rural health facilities and communities (rural health centers, village clinics)			▪	▪	▪	▪	▪					
(11) Scale-up implementation of all relevant national systems to rural health facilities and communities								▪	▪	▪	▪	▪

Activities	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(12) Design and implement a electronic central repository of both patient level and aggregate health data.			▓	▓	▓	▓						
(13) Establish national health portals to provide a single point of access for health care information (MoH website and Portal).		▓	▓	▓	▓	▓						

Focus Area: **Individual Electronic Health Records**

Strategy 8: *Adopt an incremental and distributed approach to development of national individual electronic health records for tertiary hospitals and selected health programs*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Connect care providers across the health care system so that they can effectively access and share consumer health information					▓	▓						
(2) Enable the flow of priority sets of information between care providers which includes referrals, event summaries, prescriptions, test orders/results and care plans and consumer data sets such as demographics, current health profiles and current medications lists							▓	▓	▓	▓	▓	▓

Focus Area: **Telehealthcare**

Strategy 9: *Extend the services of skilled health care professionals through development and implementation of Telehealthcare in pilot facilities at district and referral levels focusing on one particular condition.*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Develop a framework for telehealthcare to deliver health services through distance support of clinical reviews using a range of analogue, digital and mobile technologies, devices and sensors.									▓	▓	▓	
(2) Implement telehealthcare solution where technology such as email, telephone, telemetry, video conferencing, digital imaging, web and digital television are used to support clinical consultations between professional to professional, clinicians and patients, or between groups of clinicians.						▓	▓	▓	▓	▓	▓	

Focus Area: **Continuous Professional Development using E-learning**

Strategy 10: *Leverage e-learning methodology to support continuous professional development of health care workers*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Facilitate development of skills for both learners and educators, to embed e-learning in learning and teaching	■	■	■	■	■	■	■	■	■	■	■	■
(2) Constitute a working group to identify and prioritize professional development areas in health sector to be supported through e-learning									■			
(3) Identify and prioritize professional development areas to be supported through e-learning										■	■	
(4) Collaborate with training and academic institutions to design and implement delivery platforms and learning systems such as Virtual Learning Environments (VLEs), repositories, learning management systems.												■
(5) Collaborate with training institutions to develop and upload learning content, including online resources, courses and learning objects.												■
(6) Collaborate with training institutions to deliver and assess the e-learning programs to health care workers												■

Strategies for Change and Adoption Work Stream

Objective (iii):　　　　*To design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) **Identify key consumer, care provider and health care manager stakeholder segments** that should be targeted for ehealth adoption and assess their readiness to adopt specific ehealth solutions and the opportunities to build momentum.								■	■			
(2) **Develop and implement awareness campaigns** utilizing appropriate communications mechanisms and forums to promote awareness of ehealth solutions and their benefits								■	■	■		
(3) **Evaluate the effectiveness of engagement and awareness activities** by periodically measuring progress against the targets defined for the advancement of ehealth adoption across consumers, care providers and health care managers											■	■
(4) **Support awareness campaigns with a national, web-based knowledge repository** that captures ehealth project successes and enables the sharing of learning across the health care community.											■	■

Focus Area: Awareness Campaigns

Strategy 11:   *Design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers*

Focus Area: Education and Training

Strategy 12:   *Implement changes to vocational and tertiary training programs to increase the number of skilled, nationally available ehealth practitioners.*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Define a standardized ehealth competency framework for health workers and health ICT practitioners providing an understanding of required ehealth knowledge, skills and attributes for each professional group with certification system			■	■								
(2) Determine the education and training course changes required to ensure development of ehealth workforce capabilities			■	■				■				■
(3) Work with post-secondary educational institutions such to embed ehealth into their curricula			■	■	■	■	■	■	■	■	■	■
(4) Conduct an assessment of the current state of health informatics in Malawi and consult with relevant academics and health informatics practitioners (private and public sector) to understand industry and sector requirements	■	■										
(5) Conduct awareness campaign to strengthen change of attitude of care providers to ensure documentation of consumer information at all times and at all contact points.			■	■	■	■	■	■	■	■	■	■
(6) Establish a nationally recognized tertiary qualification in health informatics and implement formalized training/education programs designed to recognize and promote the spread of the specialist skill			■	■	■	■	■	■	■	■	■	■

Strategies for Governance Work Stream

Objective (iv): **To develop a governance regime which allows strong coordination, visibility and oversight of national Ehealth work program activities.**

Focus Area: **Stakeholder Consultation Forums and Working Groups**

Strategy 13: *Sustain national ehealth stakeholder consultation forums and working groups with cross sectoral representation*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Coordinate regular meetings for both National Data Standards Sub Technical Working Group and m-Health Sub Technical Working Group.	■	■	■	■	■	■	■	■	■	■	■	■
(2) Align MoH ehealth requirements with these meetings so that adequate consultations do take place on each requirement.	■	■	■	■	■	■	■	■	■	■	■	■
(3) Identify funds to enable the consultation forums to meet regularly.		■	■	■	■	■	■	■	■	■	■	
(4) Encourage key implementation partners such as eGovernment, EP&D, Accountant General, and MACRA to be well represented in MoH consultation forums especially M&E TWG.	■	■	■	■	■	■	■	■	■	■	■	■

Focus Area: **eHealth Strategy Steering Committee**

Strategy 14: *Establish and formalize a high level committee comprising key stakeholders from the health sector to oversee the implementation of the ehealth strategy*

Activities	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(1) Develop and adopt terms of reference for the ehealth strategy oversight committee					■							
(2) Establish within the Health Sector Wide Approach a reporting line for the committee					■	■						
(3) Identify members and constitute the committee							■	■				
(4) Ensure that regular meetings for the committee do take place								■	■	■	■	■