THE JOURNEY TO BETTER DATA FOR BETTER HEALTH IN TANZANIA

TANZANIA DIGITAL HEALTH INVESTMENT ROAD MAP

2017-2023

ACKNOWLEDGMENTS

Ministry, department, or agency
- Commission for Science and Technology
- eGovernance Agency
- Medical Stores Department
- Ministry of Health, Community Development, Gender, Elderly and Children
- National Health Insurance Fund
- President's Delivery Bureau
- President's Office of Public Service Management
- President's Office of Regional Administration and Local Government
- Registration, Insolvency and Trusteeship Agency

Health management teams and health facilities
- Babayu Dispensary
- Chamwino Health Centre
- Dodoma Municipal Council Health Management Team
- Dodoma Regional Health Management Team
- Ifisi District Designated Hospital
- Mbeya Referral Hospital
- Mbeya Regional Hospital
- Mbeya Regional Health Management Team
- Mbeya Rural Council Health Management Team
- Mbozi Council Health Management Team
- Mbozi Mission Hospital
- Rungwe Council Health Management Team
- Rungwe District Hospital
- Simambwe Dispensary

Training Institutions
- Ifakara Tanzanian Training Centre for International Health
- Mbeya Referral College of Nursing
- Mbozi Mission Nursing School

Partners
- Association of Public Health Laboratories
- Data for Health initiative
- Christian Social Services Commission
- Clinton Health Access Initiative
- D-Tree
- Elizabeth Glaser Paediatric AIDS Foundation
- FHI360
- GFA consulting
- Deutsche Gesellschaft für Internationale Zusammenarbeit
- The Global Fund to Fight AIDS, Tuberculosis and Malaria
- Human Development Innovation Fund (Palladium)
- I-TECH
- Ifakara Health Institute
- ITIDO
- Jhpiego
- John Snow, Inc. (JSI)
- Management and Development for Health
- Maxcom
- MEASURE Evaluation (Palladium, JSI)
- mHealth Public Private Partnership (Cardno)
- Millennium Challenge Corporation
- Minerva Strategies
- Mkapa Foundation
- NPK Technologies
- PATH
- Pathfinder International
- Public Sector Systems Strengthening (PS3) project (Abt Associates)
- Research Triangle Institute
- Smart Decision
- Swiss Tropical and Public Health Institute
- Touch Foundation
- Twiga Consulting
- United Nations Children's Fund
- United Nations Population Fund
- University of Dar es Salaam
- US Agency for International Development
- US Centers for Disease Control and Prevention
- World Health Organisation

CONTENTS

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CHMT	Council Health Management Team
CRVS	Civil Registration and Vital Statistics
DHIS2	District Health Information System
DDU	Data Dissemination and Use
eLMIS	Electronic Logistics Management Information System
HCMIS	Human Capital Management Information System
HMIS	Health Management Information System
HRHIS	Human Resources for Health Information System
HSSP IV	Health Sector Strategic Plan IV
ICD10	International Classification of Diseases version 10
ICT	Information and Communication Technology
IDSR	Integrated Disease Surveillance and Response
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MSD	Medical Stores Department
M&E	Monitoring and Evaluation
NACP	National AIDS Control Programme
NBS	National Bureau of Statistics
NHIF	National Health Insurance Fund
POPSM	President's Office Public Service Management
PORALG	President's Office Regional Administration and Local Government
RITA	Registration Insolvency and Trusteeship Agency
SAVVY	Sample Vital Registration with Verbal Autopsy
SWAp	Sector Wide Approach

EXECUTIVE SUMMARY

Better use of better data can improve health systems and health outcomes. The work of health workers and managers can be improved if they can use data to track clients, support clinical decisions, provide services efficiently, identify and solve problems, measure performance and allocate resources.

The government of Tanzania and development partners are calling for increased and improved investments in data systems and data use to strengthen their ability to make evidence-based decisions. In response, the Bill & Melinda Gates Foundation provided funding for the government of Tanzania, supported by PATH, to develop an investment road map, building on previous assessments and existing work.

A core team consisting of the Ministry of Health, Community Development, Gender, Elderly and Children, the President's Office Regional Administration and Local Government and PATH worked closely together to review existing literature, interview stakeholders, discuss findings, and formulate and cost investment recommendations.

This report describes the 17 investment recommendations prioritised by the government of Tanzania to improve health system performance through better data use (Figure 1).

FIGURE 1. INVESTMENT RECOMMENDATION ROAD MAP
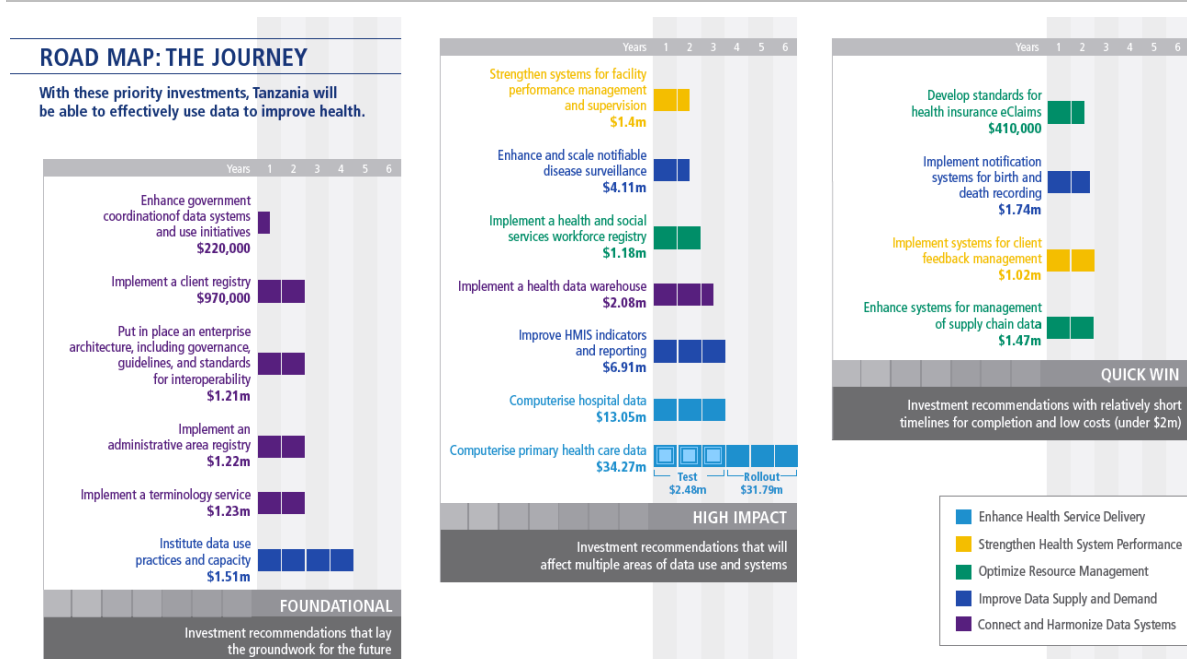
These investment recommendations were developed in accordance with the Principles for Digital Development, and with deliberate intention to leverage, not duplicate, existing work.

The investment recommendations are designed to
- Enhance service delivery,
- Strengthen health system performance,
- Optimise resource management,
- Improve data supply and demand, and
- Connect and harmonize data systems.

INTRODUCTION AND CONTEXT

At 7.7 billion, there are more mobile connections than people on the planet. Forty percent of the world's population has access to and uses the Internet. Nearly half of them are in the developing world. The use of digital technology in Africa is growing rapidly, with roughly 340 million Internet users (29 percent of the population; 7.5 percent growth rate since 2000). Information and communication technologies (ICTs) have become widely recognised as an essential and valuable tool for increasing access to and the quality of information and services.

There is increasing emphasis on maturing away from a myriad of pilots and toward proven and scaled solutions built on common standards within an architecture. ICT innovation and development is increasingly occurring in developing countries themselves. These consumer trends, coupled with declining hardware and communications costs globally, offer a huge opportunity to better use ICT as a tool to address long-standing issues in health services delivery.

In Tanzania, the government is striving to move the country to middle-income status and achieve the Sustainable Development Goals. Tanzania was able to achieve several health-related Millennium Development Goals (e.g., under-five mortality, measles-immunisation coverage, incidence of HIV/AIDS, tuberculosis mortality), but others persist unattained (e.g., maternal mortality, antenatal coverage, births with a skilled birth attendant, family planning, antiretroviral-therapy coverage, malaria incidence). To achieve these goals, the government is committed to expanding and improving the use of ICTs to strengthen the efficiency and effectiveness of its public health services.

Trends in ICT availability, affordability, and usage are creating an increasingly promising context for expanding the use of ICTs for development in Tanzania (Figure 2). There are 39 million mobile connections (21.7 percent) and this number is growing as mobile service and connectivity is expanding nationwide.[1] Tanzania is the landing point for East Africa fibre-optic cable. There are public and private investments in ICT infrastructure and increasing availability of hardware, including smartphones and tablets, at lower costs. More investments are required to leverage the ICT infrastructure for effective data systems and use for health impact.

FIGURE 2. HEALTH AND ICT IN TANZANIA
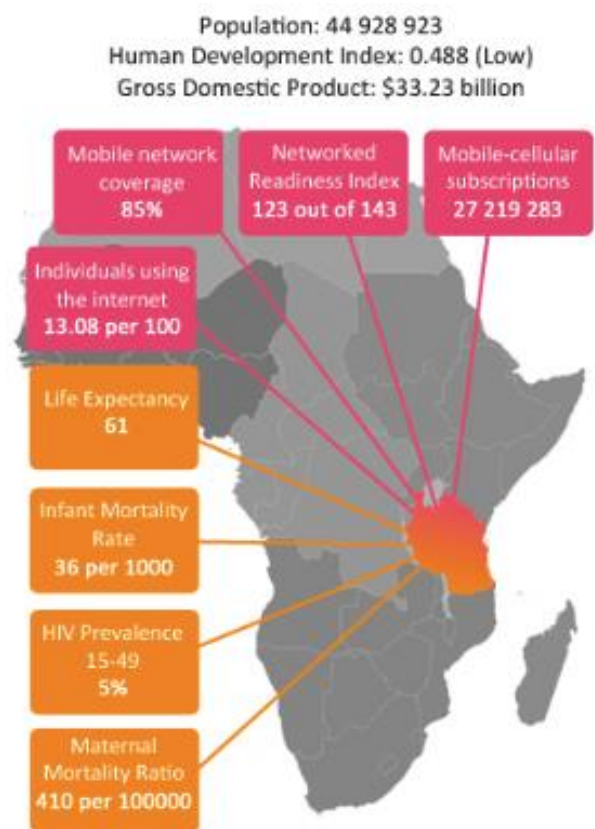
Source: Tanzania digital health dashboard page. Health.Enabled website. Available at: http://healthenabled.org/index.php/healthe-africa/country-dashboards/tanzania-digital-health-dashboard. Accessed September 25, 2016.

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[1] Page on Data Dashboard Tanzania. GSMA Website. Available at: https://www.gsmaintelligence.com/markets/3452/dashboard/. Accessed September 25, 2016.

BACKGROUND AND METHODOLOGY

The Government of Tanzania is implementing strategies, including the Health Sector Strategic Plan IV (HSSP IV) and the eHealth Strategy, to accelerate the transformation of the Tanzanian healthcare system. Our strategies aim to ensure that managers use data to identify and solve problems, measure performance and allocate resources; and that health workers use data to track clients, support clinical decisions and provide services efficiently.

It is no longer a question that ICTs are essential tools for Tanzania's health sector. Tanzania's government, in collaboration with development partners, is looking for ways to increase investments in health data systems and use in Tanzania. Better integration and use of data systems, and the information they can produce is the focus now.

Methodology

The Government formed a core group which developed and costed this investment plan in data systems and data use. This core group was led by the Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC) and President's Office Regional Administration and Local Government (PORALG), with the support of the Bill and Melinda Gates Foundation though PATH.

This core group developed this investment roadmap leading to improved health systems and improved health outcomes by building on existing strategies, building on previous assessments, supporting ongoing investment planning for government data systems and use, augmenting existing work with additional information collection, and optimizing investments so as not to repeat prior work.

While the focus was health sector, this work also looked beyond the health sector to data systems and data use issues which impact upon both the health sector and also other sectors.

Over a 10 month period, the group worked closely together to review existing literature, interview stakeholders, discuss findings, formulate investment recommendations and cost the recommendations.

The work of preparing this plan built on existing strategies including Health Sector Strategic Plan IV, the eHealth Strategy as well as the draft Health M&E strategy and draft Data Dissemination and Use strategy. This plan takes key components of those strategies and provides a detailed way forward on implementation as well as detailed costing of the proposed investments. The work builds on a literature review of more than 60 strategies, reports, and external assessments, and includes expanding further on systems inventory work.

The core group interviewed and consulted 50 people across multiple departments of MOHCDGEC and PORALG, 7 other Government departments and agencies, 16 health management teams, health facilities and training institutes and 38 partner organisations. The core group had a series of 9 working meetings including 3 meetings where experts from the broader health sector were consulted.

The following are some approaches which underlie the design of the investment recommendations:

- **Build on existing work**: These investment recommendations are designed to strengthen and add to existing work and avoid duplication of efforts as much as possible.
- **Engage local personnel**: The costing assumptions for each investment recommendation emphasize the use of Tanzanian personnel as much as possible, with foreign personnel typically serving in more of a short term technical advisor role, when needed.
- **Use electronic data systems**: The vision of the Government of Tanzania is to move towards digital systems across the country to increase accuracy and efficiency. This vision is reflected in some of the investment recommendations around enhancing electronic systems. However, we recognize that paper will likely still be used in lieu of or in conjunction with digital tools in some places.
- **Design for the ICT Infrastructure context**: Reliable connectivity and power are rapidly expanding across Tanzania, yet there are still gaps. During the requirements gathering and design stages of any new systems or system enhancements, an assessment of offline functionality needs will be important to ensure continuous functionality.
- **Plan for sustainability**: For each investment recommendation, the government and its partners must start planning for long-term sustainability from the start.

Additional detail on the methodology is provided below. Each of these steps provided valuable insight into the development of the final investment recommendation road map, ensuring it is based on thorough analysis and stakeholder engagement.

- **Literature review**: The team reviewed more than 60 documents, including government strategies and policies, external assessments, progress reports, and donor strategies.
- **Stakeholder interviews**: The team conducted three waves of interviews and consultations, including 63 representatives of government agencies, 72 representatives of development partners, and 46 representatives of regional and district health management teams, health facilities and training institutes.
- **Stakeholder network analysis**: The team developed a network analysis interview guide, which was incorporated in the key informant interview guide. The team reviewed documents and spoke with local experts to identify stakeholders and key organisations involved with data systems and data use in Tanzania. The team used snowball sampling to identify additional stakeholders and organisations.
- **Data systems mapping**: The team reviewed existing sources of information (i.e., MOHCDGEC ICT unit Health Information Systems Inventory, list of hospital information systems from PORALG and the MOHCDGEC, online inventories, etc.) and noted ICTs mentioned in the literature review and interviews. The team compiled information about each system (name, coverage/geographic use, type/purpose, connections to other systems, owners/users, and funders), and analysed gaps, redundancies, and interoperability links (or lack thereof).
- **Resource mapping**: The team collaborated with stakeholders to identify key sources of funding for data systems and data use, and conducted a series of interviews.
- **Costing of investment recommendations**: The team drafted activities and resource requirements for each investment recommendation and costed them using cost assumptions with technical experts. The team reviewed and validated activity and cost assumptions.

During analysis, the team applied the lens of the eHealth components from the "National eHealth Strategy Toolkit" of the World Health Organisation (WHO) and International Telecommunication Union (ITU). These eHealth components are: Strategy and Investment, Leadership and Governance, Legislation Policy and Compliance, Standards and Interoperability, Infrastructure, Workforce, and Services and Applications. The team examined the Tanzania eHealth landscape and gaps from this perspective. The team also applied the lens of the data use cycle to ensure the full cycle from design of data tools, data capture, converting data into information and use of information to make decisions was considered.

RATIONALE FOR INVESTMENT

Improved health outcomes depend on health systems working well – efficient and high quality health services, a skilled and available health workforce, accurate information, available drugs and commodities, adequate financial resources and effective governance. ICTs and good data management and data use are important tools to making health systems work well.

To improve health systems and health outcomes, it is important for managers to use data to identify and solve problems, measure performance and allocate resources; and for health workers use data to track clients, support clinical decisions and provide services efficiently.

Many good data systems have been designed and implemented. Building further on existing work, and improved coordination of investments and integration and governance of data and data systems are priority needs.

Key gaps impeding data use in Tanzania are summarised below (Table 1).

TABLE 1. KEY GAPS IMPEDING EFFECTIVE DATA USE

THEMATIC AREA	KEY GAPS
HEALTH SERVICE DELIVERY	• Paper tools and registers are designed to collect data for reporting, rather than serve as a useful tool for health workers to provide and track client care. • Inadequate client record keeping impedes the ability to provide continuity of care. • Health workers are overburdened by manual data processing and tallying to produce reports often do not perceive the data they collect to be useful. • Data collected by health workers at facilities and in the community are often not of high enough quality. • Health facilities are unable to track revenue and the consumption of supplies effectively. • Client payments are subject to financial leakages. • Few health facilities use electronic systems, and most facilities who do use electronic systems do not have fully featured and integrated systems needed to support continuity of quality care, improve workflows, manage resources and generate reports.
HEALTH SYSTEM PERFORMANCE	• Assessments and supervision are not always effectively translated into follow-up action plans to improve quality and performance. • There is inadequate coordination between different assessments and supervisions (and their different data collection and reporting systems) • Recommendations from one assessment team do not always systematically feed into next assessment of same facility, creating lack of continuity in managing performance • Ineffective mechanisms for clients to provide feedback on services received • No systematic ways of processing, channelling and acting upon client feedback to improve performance
RESOURCE MANAGEMENT	**Workforce**: • Multiple, disconnected human resource for health systems exist, impeding the ability to effectively identify and address staffing and skill shortages across the country, and to eliminate ghost workers. • Uneven distribution of human resources for health to provide services nation-wide. • Potential innovations in workforce communications, telemedicine and eLearning are impeded by lack of up to date comprehensive workforce registry platform. **Supplies**: • Inadequate availability and visibility of data to identify bottlenecks and stock-outs • Facilities send paper orders and reports, not accessing Electronic Logistics Management Information System (eLMIS) directly, eLMIS facility-friendly features limited. • Stock transfers between facilities not fully captured. • Further integration of different supply chain systems needed to increase efficiency. **Finance**: • Inefficiencies in processing health insurance claims submitted by facilities to insurers.

| THEMATIC AREA	KEY GAPS
DATA SUPPLY AND DEMAND	• There is a need to further develop data use practices built in to decision-making processes. • Gaps in data use skills exist, for example skills to transform data into information, critically examine and interpret data, and use data to make a decision or present an argument. • Inefficient use of available professionals with expertise in data analysis (e.g., statisticians). • Data quality is a key constraint in the health management information system. • Some vertical programs still request substantive reports outside the core HMIS (e.g. laboratory, immunization). • Report formats are not always designed to be useful for facility managers to use. • Where source data systems exist, data being re-entered into the District Health Information System (DHIS2) rather than transferred electronically, with lack of guidance on how to do so. • Lack of clear guidelines about data roles and responsibilities, reporting, and access. • Notifiable disease surveillance data systems have not been deployed in all regions. • Lack of community-level data (e.g., data on births and deaths that take place outside health facilities), leading to incomplete data on maternal and infant mortality and burden of disease.
CONNECTION AND HARMONISATION OF DATA SYSTEMS	• Inadequate coordination and sharing of lessons learnt among the different Government agencies and partners implementing 120+ health or health-related data systems. Lack of clarity on how partners should work with Government; some partners not adequately involving Government. • Relevant policies, guidelines, tools, reports and documents are not consistently organized and accessible and adhered to. • Systems inventories are not accessible and maintained online, and quickly fall out of date. • Lack of enterprise architecture that outlines how different eHealth components communicate and link with each other. • Lack of ability to exchange data across systems, causing inconsistencies and burdensome and redundant data management. • Lack of common, structured and accessible standards for health terminology such as diagnosis and drugs. • Exchange of data related to clients of health and social services sector extremely difficult, leading to poor continuity of care between service provision points, inadequate ability to track and follow up clients over time, constraints on the efficient operation of health insurance and Government subsidy schemes, and double counting in surveillance and service provision indicators. • Lack of routinely updated, accurate, accessible lists of administrative areas (i.e., districts, wards, villages), compromising geographic planning and mapping by administrative area. • Lack of single access point for different types of data for decision making in the health sector • Inadequate data use tools for decision makers such as visualisations, dashboards, mapping or drill down features.

INVESTMENT RECOMMENDATIONS

The investment recommendations are divided into these five sections (Figure 3). In each section, we provide:

- Brief context, including existing work the investment recommendations should build on.
- A summary of the investment recommendations, including total estimated cost, timing, and key outputs.
- A brief statement of the impact the investment recommendations are intended to achieve to help Tanzania's health system perform better.

Each investment recommendation has been costed as a unit. In some cases, there may be synergies and cost savings to implementing multiple investment recommendations as packages.

FIGURE 3. INVESTMENT RECOMMENDATION ROAD MAP
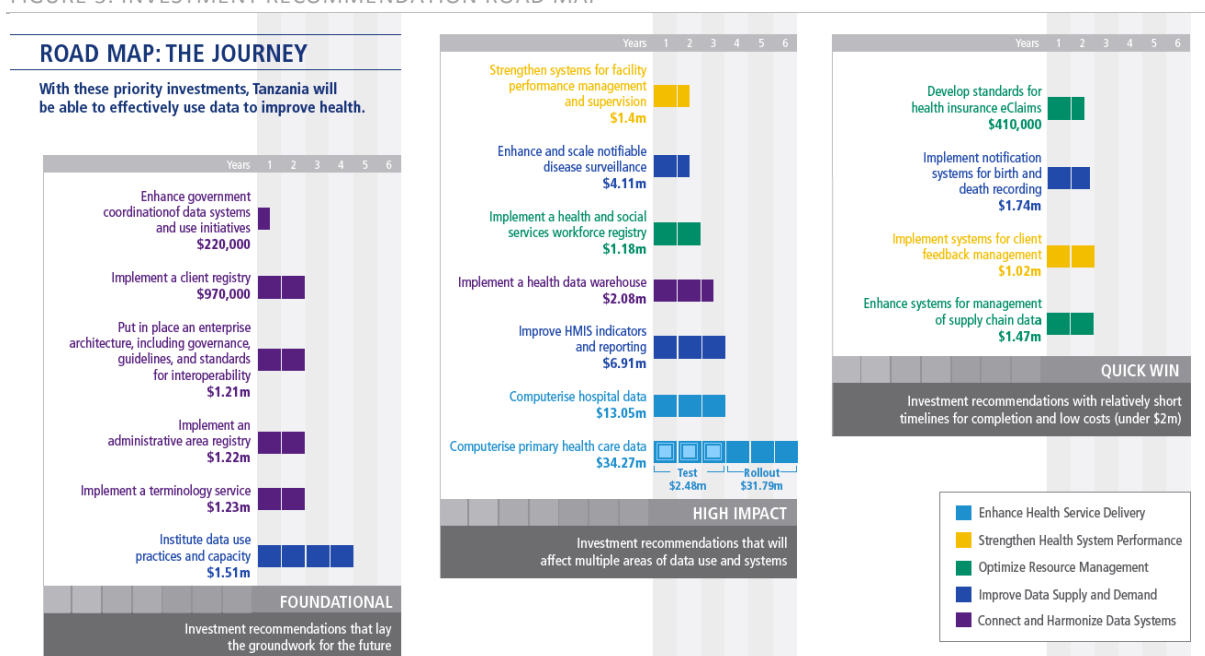
More detail on the activities proposed for each investment recommendation and their estimated costs is provided in Appendix 1.

Enhance health service delivery

Health workers are central to data use, but do not have readily accessible and actionable data to ensure a continuity of high-quality health care for their clients.

- The goal of these recommended investments (National AIDS Control Programme (NACP) CTC2 database is used for HIV care and treatment medical records in almost all hospitals.

Table 2) is to ensure that health workers across the country have the data and tools they need to track resources, understand client needs, and provide the best quality services to people seeking care.

Investment recommendations

The two investment recommendations in this section are outlined below.

The *computerise primary health care data* investment focuses on equipping health centres, dispensaries and community health workers with the hardware and software tools and the skills to use them in order to generate and use high-quality data to improve care. This links to the eHealth strategy, the draft Health Monitoring and Evaluation (M&E) strategy, and the draft Data Dissemination and Use (DDU) strategy, which call for equipping the primary health care level with appropriate software, ICT infrastructure and skills to enable client tracking and monitoring and support quality care.

This investment is intended to build on existing work in Tanzania, such as:

- The MOHCDGEC published standards and guidelines for electronic management systems for health facilities in January 2016, and is completing more detailed work on requirements for electronic medical records.
- The electronic registry tool from the Better Immunization Data (BID) Initiative could be expanded to other health areas, as well as a cascading training model that integrates product skills training with change management principles.
- Decision support algorithms based on national guidelines have been developed for pilots for smartphone-based decision support tools for primary facilities and community health workers (mainly for reproductive and child health).
- The first year of training under the new standardised curriculum for community health workers is underway and the Government plans to deploy Government-employed community health workers – this provides a key opportunity to integrate use of data tools and digital tools from the early stages of this new deployment.

The *computerise hospital data* investment is similar, though focused on the hospital level. It links to the eHealth strategy which calls for implementing hospital management information systems. This investment should build on existing work, such as:

- The MOHCDGEC has published standards and guidelines for electronic management systems for health facilities, and is completing more detailed work on requirements for electronic medical records.
- National and referral hospitals have a variety of hospital administration and laboratory data systems in place (e.g., Jeeva, WebERP, Care2X, Harmony, Bumi expert, Daisa). Many are locally owned, designed, customised, and supported.
- Forty-six regional and district hospitals have some electronic system in place, although most of these systems are focused only on revenue management. Several hospitals have started to use electronic client payment systems, and are seeing increased revenue ranging from 12 percent at Lushoto to 900 percent at Mbeya.[2,3]
- The National Health Insurance Fund (NHIF) has invested in Seven Hills' system for deployment in hospitals.

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[2] Grimm S, Ngoli B, Pfleiderer C, et al. *Tanzanian German Programme to Support Health Annual Report 2014.* Dar es Salaam: Deutsche Gesellschaft fur Internationale Zusammenarbeit GmbH and Tanzania German Programme to Support Health; 2014. Available at: https://www.giz.de/en/downloads/giz2015-report-health-tanzania.pdf.

[3] Kahango G. Hospitals ordered to use new system in revenue collections. *The Citizen.* December 14, 2015. Available at: http://www.thecitizen.co.tz/News/Hospitals-ordered-to-use-new-system-in-revenue-collections/1840340-2996248-uagsh8z/index.html.

- Laboratory systems (Labnet, BLIS Basic Laboratory Information System) are in place in most regional hospital laboratories and some district hospital laboratories. A cross-facility laboratory sample tracking system is being piloted in Mwanza region.
- National AIDS Control Programme (NACP) CTC2 database is used for HIV care and treatment medical records in almost all hospitals.

TABLE 2. INVESTMENT RECOMMENDATIONS FOR ENHANCING HEALTH SERVICE DELIVERY

Investment Recommendation: **COMPUTERISE PRIMARY HEALTH CARE DATA**	**$34.27m** Test: $2.48m Roll out: $31.79m	**6 Years** Test: 3 years Roll out: 3 years

KEY OUTPUTS
 	
• Integrated software solution for primary health care facilities and community health workers, with the following functionality:
   ○ Clinical decision support, guiding workers through proven care guidelines
   ○ Longitudinal tracking and record keeping
   ○ Revenue collection, informal sector insurance (community health fund) management, and stock management
   ○ Aggregate report production to feed into HMIS and to inform primary health care management
• Implemented on tablets and smartphones with solar power. Works offline but syncs within facility and to central database.
• Training, mentorship and support to health workers
• Documented system requirements, technical documentation, user guide, and training material
• Sustainability plan
	CAPABILITY UNLOCKED
	
	√ Health workers at the primary health care level can produce and use high-quality data to efficiently manage resources and improve care.	

Investment Recommendation: **COMPUTERISE HOSPITAL DATA**	**$13.05m**	**3 Years**
KEY OUTPUTS • Accreditation mechanism to certify hospital systems against standards and guidelines • Guidance and support for implementation of hospital systems, including system-choice, system-financing (business models, contracting mechanisms), mobile and electronic payment operationalisation, infrastructure and internal networking upgrading, and change management • Support for hardware including local networking • Support to setting up e-payments business models	**CAPABILITY UNLOCKED** √ Health workers in hospitals can produce and use high-quality data to efficiently manage resources and improve care.	

After investment

Health workers are equipped with the information and resources needed to provide prompt, appropriate, and high-quality health care to meet client needs, including:

- Tracking and managing payments and supplies.
- Maintaining client information for continuum of care.
- Supporting adherence to clinical guidelines

■ Strengthen health system performance

There are inadequate mechanisms to monitor health system performance and increase accountability to patients and clients.

The goal of these recommended investments is to ensure clients are able to hold their health providers accountable for the quality of their services, and managers have the tools they need to track and support improvement in performance.

Investment Recommendations

The two investment recommendations for this section are outlined below (Table 3).

The *strengthen systems for management and supervision of facility performance* investment is focused on improving coordination and effectiveness of supervisions and assessments, for example star rating, routine supervisions and other assessments. This links to priorities in the HSSP IV and the draft M&E strategy around operationalising performance management systems in all health facilities and improving the management and use of supervision data. This investment should build on existing work, such as:

- The Star Rating System under assesses the strengths and weaknesses of health facilities and scores and rates their performance, and formulates a performance improvement action plan. It is coordinated by the MOHCDGEC's Department of Quality Assurance.
- Facility accreditation assessments are carried out under the SafeCare scheme.
- District Council Health Management Teams (CHMTs) regularly visit health facilities to provide routine supervision, and submit data to DHIS2.
- Some districts maintain a matrix to track supervisions.
- Some districts use eTIQH (Electronic Tool to Improve Quality of Healthcare) to collect data during supervisions.
- A large range of different assessments and routine supervisory visits are carried out by national-level institutions to samples of facilities, including vertical programs, logistics/supply chain supervisions, vertical program data quality assessments, HMIS data quality assessments, and partner-led supervisions.
- The National Bureau of Statistics and MOHCDGEC conduct health facility surveys to assess service provision such as "Tanzania Service Provision Assessment Survey" and "Service Availability and Readiness Assessment"

The *implement systems for client feedback management* investment is intended to increase accountability to clients for the quality of public health and social services by establishing a mechanism for receiving and acting on client feedback. This is linked to the HSSP IV priority of increasing community engagement and partnership in ensuring high-quality public health services are delivered. This investment should build on existing work, such as:

- Some facilities have suggestion boxes for collecting feedback from clients.

- Efforts are being made to establish governing committees for health facilities to hold health facilities accountable.
- The MOHCDGEC has planned for introduction of a platform for receiving feedback, and some preparatory work has begun in Mwanza.
- Several partners have implemented pilots of feedback mechanisms, including one with a maternal and child health focus under the "Mama na Mwana" project in place in Mbeya and Niombe regions.
- Health facilities in Mwanza region are beginning to design client service charters.

TABLE 3. INVESTMENT RECOMMENDATIONS FOR STRENGTHENING HEALTH SYSTEM PERFORMANCE

Investment Recommendation: **STRENGTHEN SYSTEMS FOR FACILITY PERFORMANCE MANAGEMENT AND SUPERVISION**	**$1.4m**	**1.5 Years**

KEY OUTPUTS
 	
- Improved coordination of supervisions and assessments (including enhancements to PlanRep)
- Performance management tool for use during supervisions and assessments which
    o facilitates collection of data during supervisions/assessments
    o facilitates on-site data use to formulate quality improvement action plans
- Streamlined data management of all supervision and assessment data, providing continuity of supervision over time
- Documented system requirements, technical documentation, user guide, training material for all software enhancements
- Sustainability plan
	CAPABILITY UNLOCKED
	
	√ Health facilities can act upon supervisions and assessments to improve performance.	

Investment Recommendation: **IMPLEMENT SYSTEMS FOR CLIENT FEEDBACK MANAGEMENT**	**$1.02m**	**2 Years**
KEY OUTPUTS - Electronic client feedback platform enabling comments on service availability and provision, and tracking of feedback processing - Guidance and systematic processes in place to acknowledge, channel and act on feedback - Client service charters to display in health facilities - Documented system requirements, technical documentation, user guide, training material - Sustainability plan	**CAPABILITY UNLOCKED** √ Health sector can collect and be responsive and accountable to client feedback and needs.	

After investment

Tanzania is able to continuously identify and act on ways to improve health system performance and services to patients and clients through effective performance management systems and practices, including a stronger emphasis on capacity-building, supervision, and accountability.

- Clients are able to provide feedback and see their feedback acknowledged and acted upon.
- Facilities are able to monitor performance.
- Higher levels are able to support facilities to improve performance.

■ Optimise resource management

Managers struggle to assess resource needs and availability. Systems for human resources, health financing, and supply chains do not adequately facilitate management and deployment of resources to meet health sector needs.

The goal of these recommended investments is to ensure human, financial, and supply resources are effectively allocated according to needs.

Investment recommendations

The three investments for this section are outlined below (table 4).

The *implement a health and social services workforce registry* investment is intended to create a comprehensive, continually updated and accurate human resource registry across the public and private sectors. This will enable effective workforce management (planning, distribution, training, and retention). This will also serve as a platform on which a range of high-impact health workforce applications can be built (telemedicine, eLearning, health worker communications). This links directly to stated priorities in the Five Year Development Plan, Human Resource for Health and Social Welfare Strategic Plan, Primary Health Care Services Development Program, the eHealth strategy, HSSP IV, and the draft DDU strategy.

Existing work this investment should build on includes:

- President's Office Public Service Management (POPSM)'s Human Capital Management Information System (HCMIS)/Lawson system manages human resource data on government employees (health sector and non-health sector), but not on health workers from private or faith-based facilities nor community volunteers.
- The MOHCDGEC's Human Resources for Health Information System (HRHIS) aims at capturing data on all health sector workers, but is not kept up to date and data quality is poor. HRHIS does not currently include key registry functionality, but could be transformed into the workforce registry.
- Regulatory councils (Medical Council of Tanganyika, Nurses and Midwives Council, Pharmacy Council, etc.) each have separate, unlinked databases.
- The eHealth Steering Committee established a task team to develop requirements for a workforce registry, but it has not yet met. There is a Human Resources for Health Technical Working Group who would be a key group to coordinate this investment.
- Multiple training data systems exist (pre-service training - Training Institute Information System TIIS, in-service training- Trainsmart, TrainTracker), but they are not linked to each other nor to human resource systems, and the quality of data is poor.

This workforce registry investment, as well as being part of this "*Optimising resource management*" section of this document, is also a key component of the "*Connect and harmonise data systems*" section of this document.

The *enhance systems for management of supply chain data* investment is designed to establish a supply chain strategy and enhance and integrate data systems so that supply chain challenges and be more easily understood and resolved. This links to priorities in HSSP IV, the eHealth strategy, and the pharmaceutical section action plan 2020 around implementing eLMIS and improving efficiency and accountability in supply chain management.

This investment will build upon and further strengthen:

- The cornerstone supply chain systems currently in place and used nationwide - Electronic Logistics Management Information System (eLMIS) and Medical Stores Department (MSD) Epicor
- The vaccine module of eLMIS - the Vaccine Information Management System (VIMS) which is intended to replace the District Vaccination Data Management Tool and Stock Management Tool and is being integrated with the immunization registry to facilitate communication of stock balance, consumption and stock distribution data between health facilities and district vaccine stores.

The *develop standards for health insurance eClaims* investment is focused on standardizing the process for submitting an insurance claim, no matter who the provider or the payer is, so health facilities no longer need to access disparate systems for each insurer and it is easier for insurers to verify the claims they receive. This investment should build on existing work, such as:

- Multiple health insurance schemes are in place (National Health Insurance Fund, National Social Security Fund Social Health Insurance Benefit, private insurers), regulated by Tanzania Insurance Regulatory Association (TIRA).
- Insurers have each established systems for claims management and membership management, with these systems often built in-house or in-country.
- The modalities for informal sector insurance (community health fund) are currently being re-designed, and community health fund mobile applications have been piloted in some districts.
- Kenya and Ghana, with support from the Joint Learning Network for Universal Health Coverage, developed eClaims standards that could be adapted

Investment Recommendation: **IMPLEMENT A HEALTH AND SOCIAL SERVICES WORKFORCE REGISTRY**	**$1.18m**	**2 Years**

KEY OUTPUTS	**CAPABILITY UNLOCKED**
- Health and social services workers registry that: - Links multiple human resources and training systems across public and private sector - Stores basic identification and contact details, qualifications, employment location and history - has clear update protocols with roles for regulatory councils, imports from POPSM HCMIS, and interface for workers to update some of their own details - Is a platform on which high-impact health worker applications can be built such as eLearning, telemedicine and health worker communications - Documented system requirements, technical documentation, user guide, training material - Sustainability plan	√ Decision-makers can access high-quality, integrated data on health workers to support planning √ Platform in place on which health workforce applications can be built (telemedicine, eLearning, health worker communications)

Investment Recommendation: **ENHANCE SYSTEMS FOR MANAGEMENT OF SUPPLY CHAIN DATA**	**$1.47m**	**2 Years**

KEY OUTPUTS	**CAPABILITY UNLOCKED**
- Supply chain system strategy - Enhanced major supply chain systems including - features needed for Visibility Analytics Network approach – visibility of stocks, order adjustments and bottlenecks, data use features (e.g., proof of delivery, visibility of stocks at facility level, visibility of order status) - facility-friendly and smartphone/tablet friendly access and features - linkages to central electronic HMIS and Health facility registry - Sustainable eLMIS code base compatible with broader OpenLMIS - Documented system requirements, technical documentation, user guide, training material for all enhancements - Sustainability plan	√ Health sector can access and use data to better understand and solve supply chain challenges

Investment Recommendation: ENHANCE SYSTEMS FOR MANAGEMENT OF SUPPLY CHAIN DATA	$410,000	1.5 Years
KEY OUTPUTS • eClaims standards for submitting an insurance claim no matter who is the payer (i.e., insurer) or who is the service provider (i.e., health facility) • Governance structure to maintain and oversee standards	**CAPABILITY UNLOCKED** √ Health facilities and insurers can more efficiently process insurance claims, leading to increased financial resources for health facilities.	

After investment

Decision-makers and health workers have the data and tools they need to allocate and manage resources to provide high quality services.

■ Improve data supply and demand

Skills, motivation, and practices around data use are not adequately institutionalised, affecting data quality and limiting ability to make evidence-based decisions.

The goal of these recommended investments is to ensure decision-makers have access to high-quality health surveillance and service monitoring data, and they value and routinely use the data for decision-making.

Investment recommendations

The four investments for this section are outlined below (Table 5).

The purpose of the *improve HMIS indicators and reporting* investment is to improve quality and usability of aggregate health surveillance and service delivery data, continue the work of standardizing indicators and report formats and improve the flow of data into the central electronic HMIS). This is a priority mentioned in the eHealth strategy, draft M&E strategy, and draft DDU strategy.

This investment should build on existing work, such as:

- The MOHCDGEC M&E unit and the Health M&E Technical Working Group have made substantive progress:

  o Integrating some vertical program reports into *Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya* (MTUHA) and the central electronic HMIS (DHIS2).
  o Rolling out the web-based DHIS2 nationwide; DHIS2 is now used in all districts.
  o Supporting facilities to achieve high reporting rates.
  o Implementing a public portal to DHIS2
- Some preparatory work has been done for a mobile tool for reporting to DHIS2.
- Work in the Sentinel Panel of Districts includes support to facilities to collect routine HMIS data.

The *institute data use practices and capacity* investment is intended to build capacity for using data for decision-making and institute data use practices through toolkits, training and outreach, and mentorship of data use champions. This is a priority under the draft M&E strategy and draft DDU strategy. It should build on existing work, such as:

- The Health M&E Technical Working Group coordinates work in data dissemination and use.
- "District health profiles" are now produced by some districts using HMIS data.
- National standard data quality assessment tools have been developed and piloted
- Support has been provided to national and sub-national decision makers for data dissemination and use under several projects
- Health Training Institutes incorporate some data management and data use topics in their training of health workers, although these are sometimes limited.
- National Bureau of Statistics is working with the Eastern African Statistical Training Centre to increase data use and statistics capacity
- There is a Health M&E Masters program at Mzumbe University

The *enhance and scale a surveillance system for notifiable diseases* investment is focused on addressing resource constraints to rolling out integrated disease surveillance reporting (IDSR) nationwide, a priority of the eHealth strategy and the draft M&E strategy. This would enable quick and effective response to disease outbreaks. The MOHCDGEC M&E unit has led development and rollout of IDSR, including its electronic reporting tool, eIDSR, to 17 regions so far, but they need additional resources to roll out IDSR nationwide.

The *implement notification systems for birth and death recording* investment is focused on ensuring that all births and deaths are recorded, including those happening outside health facilities. This will ensure follow on actions such as immunisation can be taken, and it will improve the quality of data on vital statistics. This is a priority of the National Strategy for Civil Registration and Vital Statistics for Mainland Tanzania, and the draft M&E strategy. This investment should build on existing work, such as:

- Registration Insolvency and Trusteeship Agency (RITA) is responsible for legal registration of births and deaths, but relies on the health sector and local government structures for notifications of births and deaths. The National Identification Authority in turn depends on RITA for birth and death information. There is a Civil Registration and Vital Statistics (CRVS) high-level coordinating committee chaired by the Prime Minister's Office which includes the eGoverment Agency, the National Bureau of Statistics (NBS) and other institutions.
- RITA and NBS have developed a CRVS enterprise architecture, system requirements for a planned new RITA system have been established, and an investment case for CRVS funding is being written.
- RITA has piloted mobile birth registration applications in Mbeya and Mwanza regions. The Better Immunization Data (BID) Initiative has mobile birth notifications for the purposes of the immunisation registry, and various other electronic systems in the health domain also record births and deaths.
- Tablet-based verbal autopsy tools to record deaths being piloted in ten wards across five districts. Maternal and perinatal death audits implemented in several regions. Sample Vital Registration with Verbal Autopsy, (SAVVY) is a demographic surveillance system that provides estimates of mortalities based on age, sex, residence, and zone in sentinel districts.
- PORALG and the National Bureau of Statistics plan to re-establish paper "village registries" of village residents.

Investment Recommendation: **IMPROVE HMIS INDICATORS AND REPORTING**	$6.91m	3 Years

KEY OUTPUTS	CAPABILITY UNLOCKED
- Improved and streamlined standard report formats and indicators which are useful and integrated - Clear policy guidelines for HMIS, including data collection, storage, retention, privacy, reporting, access, feedback, data use, roles and responsibilities, and supervision - Central electronic HMIS receiving aggregated data from other electronic data systems, and enhanced to include revisions to indicators, a mobile reporting feature, updated data quality checks, and additional data visualizations	√ Decision-makers can access high-quality service delivery and health surveillance data.

Investment Recommendation: **INSTITUTE DATA USE PRACTICES AND CAPACITY**	$1.51m	4 Years

KEY OUTPUTS	CAPABILITY UNLOCKED
- Data use culture instituted in the health sector through development and roll out of a "data use practices toolkit" and forums for sharing best practices in data use - Capacity and skills for data use expanded through data use topics being mainstreamed into existing health sector training curricula	√ Decision-makers have skills to use data in daily activities.

Investment Recommendation: **ENHANCE AND SCALE NOTIFIABLE DISEASE SURVEILLANCE**	$4.11m	1.5 Years

KEY OUTPUTS	CAPABILITY UNLOCKED
- Enhanced electronic disease surveillance system (eIDSR) - Notifiable disease surveillance (IDSR) rolled out nationwide - Documented system requirements, technical documentation, user guide, and training material	√ Health sector can quickly and effectively respond to notifiable disease outbreaks.

Investment Recommendation: **IMPLEMENT NOTIFICATION SYSTEMS FOR BIRTH AND DEATH RECORDING**	**$1.74m**	**2 Years**

KEY OUTPUTS	CAPABILITY UNLOCKED
- Applications to capture birth and death events - from both facility and community levels - sending notifications to RITA's legal birth registration system, to "village registries" and to proposed health and social services client registry - Training and roll-out of tools including to local leaders - Documented system requirements, technical documentation, user guide, and training material - Sustainability plan	√ Health workers and local leaders can capture birth and death events taking place in communities and health facilities.

After investment

Decision-makers have access to high-quality health surveillance and service monitoring data, and they value and routinely use the data for decision-making.

◾ Connect and harmonise systems and data

Without enterprise architecture, standards, and strong governance structures, leaders in the health sector struggle with disparate data systems and digital health projects that collect data in slightly different ways, making it difficult to share and use data.

The goal of these recommended investments is to ensure digital health systems in Tanzania are appropriately linked and compatible according to a national enterprise architecture and standards.

Investment recommendations

The six investments for this section are outlined below (Table 6).

In this section three registries are proposed (client registry, terminology registry services and administrative area registry), and the *Optimize Resource Management* section also contains an investment recommendation for a health and social services workforce registry. The national health facility registry has already been established, although work remains to link it with other systems. The purpose of registries is to allow data to be more easily linked together, through allowing people and systems to refer to same data in the same way. Registries also include mechanisms for data systems to subscribe to updates, and therefore allow reference data to be consistent across systems even when that data changes frequently.

The *enhance government coordination of initiatives* for *data systems and use* investment is designed to enable the government to better coordinate and align data systems and data use initiatives with priorities and existing work. There are more than 120 digital health-related data systems and applications owned or approved by different ministries, departments, agencies, partners, and multiple TWGs and task teams. This recommendation links to priorities in the eHealth strategy and HSSP IV, and should build on existing work, such as:

- There are several technical working groups and task teams assisting the government with implementing strategies and coordinating investments. Some are highly active with frequent meetings, broad and engaged participation, and programs of work.
- The Sector Wide Approach (SWAp) committee, which holds the Joint Annual Health Sector Review, is a coordinating mechanism for the entire health sector.
- The eHealth Steering Committee meets regularly to ensure that the eHealth strategy components are financed and implemented, and has an Enterprise Architecture Technical Working Group.
- The Health M&E Technical Working Group has been active since 2010 with broad participation.
- There is a laboratory information systems technical working group.
- The mHealth Community of Practice is an active, partner-led initiative to share experiences in aligning and implementing mHealth applications.
- The MOHCDGEC and PORALG websites include some documents.
- There have been previous attempts at designing standardised forms for eHealth/mHealth partners to fill in and submit, but these have not been broadly adopted or institutionalised.

The *Put in place an enterprise architecture, including governance, guidelines, and standards for interoperability* investment fills the gaps in governance structures to facilitate interoperability and monitor compliance, and is a priority of the eHealth strategy. This investment should build on existing work, such as:

- The eHealth Steering Committee (eHSC) was established with a mandate to perform governance functions for the eHealth strategy, but has not yet developed interoperability guidelines or standards, or put in place mechanisms to monitor systems for compliance with standards.
- The Enterprise Architecture technical working group has been established under the eHSC and consists of several task teams:
    - Care Delivery: focusing on standards for client-level data and electronic medical records, and a way forward for the client registry.
    - Decision Support: developing initial requirements for a data warehouse.
    - Health Information Access: developing initial requirements for a health information mediator.
    - Healthcare Resources (has not yet met)
- A national health facility registry has been developed, although it still needs to be connected to other systems.
- The eGovernment Agency has published some standards and guidance on interoperability between government systems, but these are not specific to the health sector. The eGovernment Agency also plans to establish an Enterprise Service Bus to mediate data exchange between government systems, but the health sector requires specialised mediation services.

The *implement a client registry* investment will facilitate ensuring that all individuals served by the health and social services sector can be tracked across multiple points of service. The health and social services client registry is proposed to be separate from, but linked to, legal identification systems. The client registry is a priority in the eHealth strategy. This investment should build on existing work, such as:

- Progress is being made in legal identification systems (by the National Identification Authority, the Electoral Commission, RITA, the Prime Minister's Office, and the eGovernment Agency); however, the need for identification of clients of the health and social services sector is separate from but linked to legal identification because:

    o The health sector encounters people before the legal sector does (infants, unregistered persons).
    o Legal identification cannot be a prerequisite to providing health and social services.
    o The health and social services sector identification needs to be less stringent than legal identification.

- A "way forward for client registry" document is being drafted by the Care Delivery Task Team under the enterprise architecture technical working group of the eHealth Steering Committee, but more substantial requirements analysis is needed.
- The Better Immunization Data (BID) Initiative has included a client registry as a demonstration initiative.
- The Tanzania Social Action Fund (TASAF) has a large database of individual recipients of social security support.

The *implement a terminology service* investment is intended to standardise how the health sector refers to health terminology such as diagnosis and drugs, and make those standards accessible to health workers and to data systems. This is needed for data exchange and comparability between different data systems and sources. This is a priority in the eHealth strategy and the draft M&E strategy. It should build on existing work, such as:

- Tanzania has adopted a customised version of International Classification of Diseases (ICD10) for diagnoses, but it is not yet accessible online. Some training has been conducted under the Data for Health Initiative.
- The Tanzania Food and Drug Authority regulates drugs, and Medical Stores Department (MSD) manages the supply chain of drugs. Drug coding systems are shared between MSD Epicor and eLMIS, but are different than those of the Tanzania Food and Drug Authority and vertical programs.
- The Enterprise Architecture Technical Working Group established a task team to work on a way forward for terminology standards and registry, but substantive work has not yet begun.
- Work is underway on a Swahili corpus for health terminology.

The *implement an administrative area registry* investment is intended to create a single, accessible and updated source of information about Tanzania's administrative areas. Administrative areas are the geographical units for organisation of Government services and administration, such as villages, wards and districts. This investment is broader than the health sector, and will be very useful to the health sector and also to other sectors. The investment will facilitate accurate data analysis and mapping visualisations by administrative area. This should build from the existing context:

- There is a legal process for changing administrative areas through the issuance of Government notices in the *Government Gazette.*

- PORALG maintains lists of administrative areas in Excel files.
- The National Bureau of Statistics collects and processes shape files (area borders) at census time, every ten years.
- The Ministry of Lands leads work on geographic information system mapping, but not of administrative areas.
- The Tanzania Communications Regulatory Authority has an initiative in place to issue post codes.

The *implement a health data warehouse* investment will enable decision-makers to easily access data analysis tools and data from a range of source systems in one place – such as data on service delivery, human resources, supply chain, laboratory, financial and insurance. This is a priority in the eHealth strategy and the draft M&E strategy. Existing work this investment should build on includes:

- The MOHCDGEC commissioned a high-level requirements document for a health data warehouse. There is a task team under the Enterprise Architecture TWG developing these requirements further.
- Exploration of whether or not DHIS2 could or should be adapted for the health data warehouse is important.
- The eGovernment Agency and Open Government Partnership coordinate work to make data more open to the public, and have established an open data dashboard which includes health data. The DHIS2 public portal also includes a series of dashboards.

TABLE 6. INVESTMENT RECOMMENDATIONS FOR CONNECTING AND HARMONISING DATA SYSTEMS

Investment Recommendation: **ENHANCE GOVERNMENT COORDINATION OF DATA SYSTEMS AND USE INITIATIVES**	$220,000	6 Months

KEY OUTPUTS
 	
 • Enhanced MOHCDGEC/PORALG website incorporating:
     o a continuously updated systems inventory which is comprehensive, organized, accessible, and easily updateable
     o comprehensive digital library of data systems and data use including policies, legislation, guidelines and tools
 • Project implementation guidelines for partners working in data systems and use
 • Enhanced coordination between different committees and working groups
	CAPABILITY UNLOCKED
	
	 √ Government can track and coordinate data systems and use initiatives in the health sector.	

Investment Recommendation: **PUT IN PLACE AN ENTERPRISE ARCHITECTURE, INCLUDING GOVERNANCE, GUIDELINES, AND STANDARDS FOR INTEROPERABILITY**	$1.21m	2 Years

KEY OUTPUTS	CAPABILITY UNLOCKED
- National eHealth standards framework including: - eHealth architecture building blocks - Business process maps and their linkages - Business, information, and technology architectures - Governance framework for enterprise architecture - Enhanced enterprise architecture capacity in the MOHCDGEC and PORALG - Software refinements to key systems to make them compliant with enterprise architecture	√ Health sector stakeholders can link data systems together.

Investment Recommendation: **IMPLEMENT A CLIENT REGISTRY**	$970,000	2 Years

KEY OUTPUTS	CAPABILITY UNLOCKED
- A client registry of all individuals served by health and social services sector. This registry will: - Allow read-and-write access by a range of systems across the health and social services sector in accordance with defined rules on privacy and consent - Store only data useful in identifying clients and a list of places they have been seen - Provide client matching and de-duplication services - Documented system requirements, technical documentation, user guide, and training material - Sustainability plan	√ Health and social services sector can track individual clients over time and across multiple points of service.

Investment Recommendation: **IMPLEMENT A TERMINOLOGY SERVICE**	$1.23m	2 Years

KEY OUTPUTS	CAPABILITY UNLOCKED
- Terminology standards, including for diagnoses, drugs, and medical supplies - Terminology registry service, including lists and classifications of medical terminology made available as a update service to other data systems - Documented system requirements, technical documentation, user guide, and training material - Sustainability plan	√ Health sector can transfer and analyse data easily across systems through well-defined, consistent health terminology.

Investment Recommendation: **IMPLEMENT AN ADMINISTRATIVE AREA REGISTRY**	**$1.22m**	**2 Years**

KEY OUTPUTS	CAPABILITY UNLOCKED

• Administrative area registry for example of villages, wards, districts, which
    o Is publically accessible, with update service available to other data systems
    o Is continually updated by PORALG and districts, with coding which is consistent over time and history of changes
    o Includes details of local government leaders
    o Includes boundaries (shape files), enabling other systems to easily display data in maps
• Documented system requirements, technical documentation, user guide, and training material
• Sustainability plan
	√ The government and the public can compare and analyse data structured by geographic administrative areas.

Investment Recommendation: **IMPLEMENT A HEALTH DATA WAREHOUSE**	**$2.08m**	**2.5 Years**

KEY OUTPUTS	CAPABILITY UNLOCKED

• Further development of data warehouse requirements including identifying key users, their specific data needs, how they want their data displayed and what data use features and visualisations they require
• Data warehouse which
    o receives data extracted routinely from other systems (including data on service delivery, human resources, supply chain, lab, financial and insurance)
    o transforms data into formats which are efficient for electronic analysis and comparison
    o makes data easily available, accessible and digestible through data visualization and data analysis tools, eg dashboards, graphs, maps, drill-down features
    o is one-stop-shop for data from a range of different sources
• Documented system requirements, technical documentation, user guide, and training material
• Sustainability plan
	√ Decision-makers can easily access data-analysis tools and data from a range of source systems.

After investment

Tanzania has the digital health infrastructure and governance to ensure data systems are standards-based and interoperable, regardless of the underlying technology. There is agreement regarding content, coding, and communication formats, enabling more effective data sharing and use.

IMPACTS ON HEALTH SYSTEMS

Service delivery

These investments are envisaged to have a large impact on service delivery, especially through the computerization of primary care and hospitals, better supervision and performance management and better tracking of individual clients.

Health workforce

These investments are envisaged to have a large impact on our health workforce. Giving health workers electronic tools to use at the point of care will support them to follow clinical guidelines. Through the health and social services workers registry, decision makers will have high quality linked-up data on the health workforce – who they are, where they are, what qualifications and training they have, across public and private sectors. The workers registry is also a platform that other applications can be built upon, for example telemedicine applications, eLearning applications and tools for the Government to easily communicate with the health workforce.

Information

All of the investment recommendations are designed to ensure that health workers and managers have information they need to work more effectively and make informed decisions.

Medical supplies

These investments are envisaged to have positive impacts on the supplies of drugs and commodities at our facilities. Through computerization, health facilities will be able to better internally manage their stocks and orders. Medical Stores Department and the supply chain will function better and stakeholders throughout the supply chain will be able to clearly see where the bottlenecks are and solve problems. Different systems will be able to refer to drugs in the same way and easily exchange information.

Financing

These investments are envisaged to have positive impacts on the financial resources in our health sector. Computerising health facilities will lead to streamlined administration of client payments, insurance and subsidies at facilities, with fewer financial leakages. Insurance claims systems will be more efficient. Better identification of clients will allow Government, donors and insurers to better manage claims, subsidies and funding.

Governance

These investment recommendations are envisaged to improve management and governance, as well as improve transparency. Health service providers will be more accountable to supervisors and to clients for quality of services. Through the administrative area registry, Government can more easily manage and monitor administrative areas and local leaders, which will have an impact broader than the health sector. We will see better coordination, with better sharing of lessons learnt. More transparency will improve accountability.

CONCLUSION

The government of Tanzania calls on development partners to join in taking up these investment recommendations to achieve this vision of health systems transformation through better data systems and data use, in order to have a healthy society with improved social wellbeing that will contribute effectively to individual and national development.

Appendix 1: Costing and activities

The following table summarises total costs broken down by national and local levels, and broken down by cost type.

FIGURE 4. INVESTMENT RECOMMENDATION COST ESTIMATES (US$ MILLIONS)

		Total	Breakdown by level		Breakdown by cost type			
			National	Local levels	LOE	Workshops, trainings, meetings, etc.	Software development / support	Equipment
Computerise primary health care data	Testing	2.5	1.7	0.8	0.7	0.5	1.1	0.2
	Roll-out	31.8	0.7	31.1	3.1	14.7	-	14.0
Computerise hospital data		13.1	1.0	12.1	2.2	1.5	3.0	6.4
Strengthen systems for facility performance management and supervision		1.4	0.7	0.7	0.5	0.4	0.3	0.2
Implement systems for client feedback management		1.0	0.6	0.4	0.5	0.5	-	-
Implement a health and social services workers registry		1.2	0.8	0.4	0.4	0.5	0.3	-
Enhance systems for management of supply chain data		1.5	1.2	0.3	0.4	0.3	0.8	-
Develop standards for health insurance eClaims		0.4	0.4	-	0.2	0.2	-	-
Improve HMIS indicators and reporting		6.9	2.8	4.1	1.0	5.3	0.6	-
Institute data use practices and capacity		1.5	1.2	0.3	1.3	0.2	-	-
Enhance and scale notifiable disease surveillance system		4.1	0.1	4.0	0.1	4.0	-	-
Implement notification systems for birth and death recording		1.7	0.5	1.2	0.3	1.1	0.3	-
Enhance Government coordination of data systems and use initiatives		0.2	0.2	-	0.1	0.1	-	-
Put in place an enterprise architecture, including governance, guidelines, and standards for interoperability		1.2	1.2	-	0.6	0.3	0.3	-
Implement a client registry		1.0	1.0	-	0.4	0.2	0.4	-
Implement a terminology service		1.2	1.2	-	0.5	0.3	0.4	-
Implement an administrative area registry		1.2	1.0	0.2	0.4	0.3	0.5	-
Implement a health data warehouse to house data from all relevant sources to facilitate decision making		2.1	1.2	0.9	0.5	0.9	0.7	-
Grand total		74.0	17.4	56.6	13.2	31.2	8.8	20.8

These costs were established through a detailed process of designing activities, resource requirements and cost assumptions. Below are break downs of costing by activity within each investment recommendation.

COMPUTERISE PRIMARY HEALTH CARE DATA

Cost: $34.27m, which is $2.48m for a 3 year testing phase, and $31.79m for a 3 year roll-out phase
Timing: 6 years – 3 years testing and 3 years roll-out

TEST-NATIONAL	COST
Develop requirements for an integrated suite of software tools for health centres, dispensaries and community health workers.	$380,000
Review existing electronic tools for primary health-care level to produce "way forward" report.	$100,000
Develop/enhance/adapt existing software tools based on identified gaps and requirements.	$1.17m

TEST-REGIONAL AND LOCAL	COST
Procure hardware (tablets, smartphones, solar chargers), data bundles, and associated maintenance services for health centres, dispensaries and community health workers.	$320,000
Test software solution within primary health care.	$510,000

ROLL OUT-NATIONAL	COST
Enhance "how-to-computerise health centres, dispensaries and community care" guidelines.	$80,000
• Recruit and train national coordinators. • Facilitate discussions between Ministries and private sector about connectivity expansion. • Provide support and guidance to district-level primary care computerization advisors.	$610,000

ROLL OUT-REGIONAL AND LOCAL	COST
Procure and distribute hardware (tablets, smartphones, solar chargers), data bundles, and associated maintenance services for health centres, dispensaries and community health workers.	$14.09m
Recruit and train district-level primary health-care computerization advisors on how to computerize primary health-care data.	$470,000
Provide support and guidance to primary health-care workers and other district personnel on how to use software tools and resulting data.	$8.12m
Train primary health-care workers on how to use software tools and resulting data.	$8.42m

COMPUTERISE HOSPITAL DATA

Cost: $13.05m
Timing: 3 years

NATIONAL	COST
Enhance hospital systems standards and guidelines	$150,000
Further develop the "how-to-computerise" guidelines for hospitals	$170,000
Establish and implement an accreditation mechanism to review hospital systems on the market to ensure they meet developed standards and guidelines.	$560,000
Facilitate discussions on business models for mobile and electronic payments.	$40,000
• Support rollout of the computerisation guideline (support and manage regional staff) • Support coordination between the government and private stakeholders on connectivity and networking expansion.	$30,000

REGIONAL AND LOCAL	COST
Train regional hospital computerisation advisors on the computerization guide	$1.34m
Roll out the computerization guide through the regional hospital computerization advisors	$1.2m
Provide hospitals with hardware, networking, connectivity and infrastructure maintenance contracts	$6.47m
Provide hospitals with software support and training through software-as-a-service model	$2.98m
Train facility management in hospital computerisation management	$110,000

STRENGTHEN SYSTEMS FOR FACILITY PERFORMANCE MANAGEMENT AND SUPERVISION

Cost: $1.4m
Timing: 1.5 years

NATIONAL	COST
Review guidelines/policies/processes linked to performance management/supervision of facilities to produce harmonised guidelines	$120,000
Develop requirements for on-site supervision/performance management tool for use by supervisors or assessors who visit facilities	$60,000
Develop/adapt on-site supervision/performance management tool in line with requirements	$260,000
Enhance central electronic HMIS to incorporate all supervision/assessment data	$30,000
Enhance PlanRep to facilitate scheduling of supervision/assessments	$60,000
Train national personnel on the revised supervision/assessment procedures and tools	$170,000

REGIONAL AND LOCAL	COST
Procure tablets for national/district-level supervisors/assessor to use during facility supervisions/assessments	$230,000
Train district-level personnel on revised supervision/assessment procedures	$470,000

IMPLEMENT SYSTEMS FOR CLIENT FEEDBACK MANAGEMENT

Cost $1.02m
Timing: 2 years

NATIONAL	COST
Develop a guideline and strategy for feedback collection, processing workflows, and follow-up	$240,000
Develop a Unstructured Supplementary Service Data (USSD)/Short message service (SMS) feedback tool and feedback-processing interface and liaise with mobile-network operators.	$30,000
Support and train feedback-reception team who will: • Categorise incoming feedback • Channel feedback to relevant parties through periodic feedback summaries sent out to national, district and facility levels, as relevant • Send phone and SMS feedback to relevant parties on urgent issues • Give the client acknowledgement and information on steps being taken	$170,000
Train the feedback processing team	$30,000
Develop and launch marketing campaign for the general public	$90,000
Socialise the feedback system at the national level through launch event and briefing meetings	$30,000
Develop a plan for sustainability and ownership of the system	$30,000

REGIONAL AND LOCAL	COST
Socialise the feedback system among health workers and district personnel through district meetings	$400,000

IMPLEMENT A HEALTH AND SOCIAL-SERVICES WORKERS REGISTRY

Cost: $1.18m
Timing: 2 years

NATIONAL	COST
Develop business requirements and governance processes for a workforce registry	$230,000
Develop the workforce registry software and set up the application processing interface (API) and interoperability with other systems	$300,000
Train national data users (regulatory councils, POPSM, MOHCDGEC and partners who manage volunteer community workers), and district-level training facilitators	$170,000
Launch and socialise workforce registry	$10,000
Familiarise software developers in the health-care sector with how to link existing systems to, and develop add-on applications for, the workforce registry	$30,000
Provide ongoing review, maintenance, and user support and communications	$70,000
Develop a sustainability plan	$30,000

REGIONAL AND LOCAL	COST
Train district users	$340,000

ENHANCE SYSTEMS FOR MANAGEMENT OF SUPPLY-CHAIN DATA

Cost: $1.47m
Timing: 2 years

NATIONAL	COST
Develop a supply chain system strategy (10-year)	$180,000
Develop detailed requirements for further development and linking of eLMIS, VIMS, MSD Epicor, and other supply chain systems	$140,000
Develop enhanced features for major supply chain systems	$790,000
Provide ongoing review, maintenance, and user support	$50,000

REGIONAL AND LOCAL	COST
Train district users in how to monitor supply-chain challenges using data	$310,000

DEVELOP STANDARDS FOR HEALTH INSURANCE ECLAIMS

Cost: $410,000
Timing: 1.5 years

NATIONAL	COST
Develop eClaims standards.	$230,000
Launch and socialise eClaims standards.	$10,000
Familiarise software developers of hospital and insurance-claims systems with how to operationalise eClaims standards.	$10,000
Develop a governance structure to maintain eClaims standards.	$160,000

IMPROVE HMIS INDICATORS AND REPORTING

Cost: $6.91m
Timing: 3 years

NATIONAL	COST
Develop HMIS data policy guidelines.	$120,000
• Review, update, and standardize HMIS indicators and report formats, ensuring report formats encourage local data use, and removing any excess indicators. • Complete integration of vertical programs into HMIS. • Validate and update rules for data quality checks.	$1.95m
Enhance central electronic HMIS.	$550,000
Develop guidelines on how data can be transferred from point-of-care and other source systems into central electronic HMIS.	$70,000
Facilitate upgrade of existing point-of-care and other systems to allow data transfer into central electronic HMIS.	$30,000
Train national users and district-level trainers on improved HMIS indicators and system.	$130,000

REGIONAL AND LOCAL	COST
Train district users on improved HMIS indicators and system.	$2.24m
Train facility staff in how to compile and use revised indicators and report formats.	$1.82m

INSTITUTE DATA USE PRACTICES AND CAPACITY

Cost: $1.51m
Timing: 4 years

NATIONAL	COST
• Develop a data use toolkit, including guidelines and change management practices, for all levels of the health system. • Coordinate leadership of the health data governance structure.	$220,000
• Review and strengthen data use practices in pre-service and in-service training curricula for all health care workers. • Provide ongoing support to training institutions to use updated pre-service and in-service training curricula.	$280,000
• Assess job descriptions in roles that should be primary data users and provide recommendations on revisions to explicitly require the use of data. • Enhance existing skill-development tools and resources to include data-use practices.	$210,000
Sensitize national policymakers and train national leaders and facilitators on the data use toolkit and mentorship.	$130,000
Hold national-level stakeholder workshops to socialize the data use toolkit and the health data governance structure.	$30,000
Conduct meetings and other outreach to prospective data use champions and provide speaking opportunities for champions at community workshops.	$100,000
Conduct an assessment of rollout and uptake of the data use toolkit and changes in health data governance.	$60,000
Monitor the compliance level of health care training institutes with the updated data use curricula.	$110,000

REGIONAL AND LOCAL	COST
• Train regional and district leaders, HMIS leads, and statisticians on the data use toolkit. • Identify and contract with training institutions to organize in-service trainings for health workers on data use practices in target regions.	$290,000
Conduct refresher trainings with regional staff, including new policies, guidelines, and best practices (e.g., every two years).	$80,000

ENHANCE AND SCALE NOTIFIABLE DISEASE SURVEILLANCE

Cost: $4.11m
Timing: 1.5 years

NATIONAL	COST
Review eIDSR performance in ten regions to identify gaps.	$20,000
Enhance eIDSR design to address identified gaps.	$60,000

REGIONAL AND LOCAL	COST
• Roll out IDSR in the remaining 15 regions, including enhanced eIDSR. • Conduct refresher training in existing ten regions.	$4.03m

IMPLEMENT NOTIFICATION SYSTEMS FOR BIRTH AND DEATH RECORDING

Cost: $1.74m
Timing: 2 years

NATIONAL	COST
Develop requirements for applications for birth and death notifications from communities and health facilities to legal birth registration system, "village registries," and client registry.	$180,000
Develop or enhance applications for birth and death notification.	$310,000

REGIONAL AND LOCAL	COST
Train district facilitators in use of applications at the ward and village levels.	$310,000
Train community and local leaders on use of applications.	$940,000

ENHANCE GOVERNMENT COORDINATION OF DATA SYSTEMS AND USE INITIATIVES

Cost: $220,000
Timing: 6 months

NATIONAL	COST
Develop project implementation guidelines for partners working in data systems and use, including how to communicate with Government.	$10,000
• Design a systems inventory and add to the MoHCDGEC/PORALG website. • Enhance the digital library on the MOHCDGEC/PORALG website to ensure policies, legislation, and guidelines are accessible and available. • Design and implement mechanisms to keep the systems inventory and the digital library up to date.	$130,000
Review the roles of different technical working groups and committees dealing with health data and data systems to avoid duplication of mandates and improve coordination.	$80,000

PUT IN PLACE AN ENTERPRISE ARCHITECTURE, INCLUDING GOVERNANCE, GUIDELINES, AND STANDARDS FOR INTEROPERABILITY

Cost: $1.21m
Timing: 2 years

NATIONAL	COST

• Develop a national eHealth architecture framework, including:
   • Develop business, information, technology architecture
   • Identify building blocks for eHealth architecture
   • Document business processes and how they link together
   • Develop standards, policies, and guidelines for a national eHealth architecture
• Identify and establish a governance structure for eHealth architecture.
• Develop a gap analysis and roadmap for implementation.
• Build the capacity of MOHCDGEC and PORALG in Enterprise Architecture.
• Build the capacity of health systems leaders to understand and advocate national eHealth architecture.
	$930,000

Facilitate the upgrade of existing systems to make them compliant with enterprise architecture.	$280,000

IMPLEMENT A CLIENT REGISTRY

Cost: $970,000
Timing: 2 years

NATIONAL	COST
Develop requirements and business and governance processes for a client registry.	$330,000
Develop client registry software.	$300,000
Train MOHCDGEC staff who will perform de-duplication and other data-administration tasks.	$50,000
Support dedicated administration/de-duplication staff for the first year.	$90,000
Familiarise software developers working in the health sector with how to connect their systems to the client registry.	$30,000
Support the connection of existing systems with the client registry (software adjustments needed to existing systems).	$90,000
Perform ongoing review, maintenance and user support.	$50,000
Develop a plan for sustainability and ownership of the registry.	$30,000

IMPLEMENT A TERMINOLOGY SERVICE

Cost: $1.23m
Timing: 2 years

NATIONAL	COST
Develop, adopt, and harmonise standards and coding systems for referencing drugs and medical supplies, diagnosis, procedures etc.	$470,000
Develop requirements for a terminology registry.	$270,000
Develop a terminology registry and an API.	$360,000
Train terminology-management and administration staff at the MOHCDGEC.	$30,000
Familiarise software developers working in the health sector in how to subscribe to the terminology service.	$20,000
Ongoing review, maintenance and user support.	$50,000
Develop a plan for sustainability and ownership of the system.	$30,000

IMPLEMENT AN ADMINISTRATIVE AREA REGISTRY

Cost: $1.22m
Timing: 2 years

NATIONAL	COST
• Develop a governance structure to manage administrative-area data. • Develop requirements for the administrative-area registry.	$260,000
Develop administrative-area registry software.	$520,000
Train users at the national level, and train trainers.	$60,000
Launch and socialise the administrative-area registry.	$10,000
Familiarise software developers working in the health sector in how to subscribe to the service and use shape files for mapping in their systems.	$20,000
Perform ongoing review, maintenance and user support.	$50,000
Develop a plan for sustainability and ownership of the system.	$30,000

REGIONAL AND LOCAL	COST
Train users at the district level.	$270,000

IMPLEMENT A HEALTH DATA WAREHOUSE TO HOUSE DATA FROM ALL RELEVANT SOURCES TO FACILITATE DECISION-MAKING

Cost: $2.08
Timing: 2.5 years

NATIONAL	COST
Build on existing requirements, including further specifying who the key users will be and what their data needs are (including features and visualizations) and identifying data sources.	$220,000
Develop or adapt the data warehouse.	$630,000
Train national decision-makers in the use of the data warehouse and train trainers.	$230,000
• Perform ongoing review to ensure the data warehouse is meeting evolving needs. • Perform ongoing maintenance, customization, and user support.	$90,000
Develop a plan for sustainability and ownership of the system.	$30,000

REGIONAL AND LOCAL	COST
Train regional and district decision-makers on the use of the data warehouse.	$880,000

Appendix 2: Non-costed recommendations

During the process of designing the investment recommendations, some investments were prioritised for costing, whereas others were not costed at this time. The following table shows the investment recommendations which were not costed. In several cases, these investments are investments which can build upon the costed investment recommendations at a later stage.

Non-costed Investment Recommendation	Activities
Develop eLearning platform for health workers and provider communications and updates systems	• Develop accreditation mechanism for eLearning courses • Further develop and support blended distance learning courses • Develop/implement health eLearning Platform including online courses for continuous medical education, with accreditation • Develop mechanism to support ongoing communications for sending to health care providers e.g about policy or guidelines introduction or changes
Put in place provider-to-provider telemedicine processes	• Develop and establish roles, responsibilities, and workflows in provider-to-provider telemedicine • Develop guidelines on compensation/financing for remote provider-to-provider consultations. • Identify infrastructure requirements for provider-to-provider telemedicine. • Develop/adopt/customise platform to facilitate provider-to-provider telemedicine • Roll out provider-to-provider telemedicine
Enable two-way health information communications and provider-client telemedicine	• Develop requirements and business case for two-way health information communication, customized to client needs • Develop remote consultation guidelines - clinical guidelines/regulations for remote consultations.

Non-costed Investment Recommendation	Activities
Develop shared health records	• Develop requirement for shared health records to ensure sharing and privacy policy included within broader data policy • Develop review mechanisms to asses readiness of applications before being allowed to share data to shared health record • Develop requirements for linking SHR with BCC/IEC applications. • Develop SHR as a national system
Improve links between district health plans and expenditure	• Develop linkage between PlanRep and Epicor through an interoperability layer • Develop public portal to planning and expenditure data for accountability
Develop system for social welfare client data management	• Develop social welfare case management system • Provide linkage between social welfare case management system and client registry
Develop effective emergency services and transport	• Develop systems for emergency services and transport including women in labor, road accidents • Establish collaboration mechanisms between police and health facilities in cases of road accidents
Put in place systems for sample referral to remote laboratories and result communication	• Develop requirements for system to send test samples to higher level laboratories without sending client themselves, and to receive back results, building on the "Sample Referral and Transport System hub" for HIV early infant diagnosis. • Develop or enhance electronic system • Roll out system
Improve management of informal sector health insurance	• Develop requirements for applications to manage membership and payouts of informal sector health insurance (successors to community health funds), building on piloted Community Health Fund applications • Develop applications • Roll out applications

Non-costed Investment Recommendation	Activities
Improve existing electronic tools and systems to support data access	• Identify mechanisms to facilitate data access based on available policies and guidelines i.e which data should be accessible to whom, linked to open data policy guidelines • Develop mechanisms to establish which data from which systems should be more widely accessible, or open to the public, as appropriate • Devise a way to enable broader or public access to data as appropriate
Improve existing electronic tools and systems to support data use	• Identify requirements in collaboration with end users at all levels on reporting, data visualization and dashboard requirements • Improve data use tools/features to fulfill identified requirements
Improve software project management	• Develop capacity of the government in business process mapping, requirements gathering, issues and bug tracking, testing, team-based software development, and system maintenance and management. • Put in place mechanisms to ensure that local software developers are involved in software projects, and software projects are well documented, for sustainability