

MINISTRY OF WATER AND IRRIGATION



The United Republic of Tanzania

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) STRATEGY 2010 - 2014

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FOREWORD

The Information and Communication Technologies (ICT) Strategy 2010-2014 aims at guiding the deployment of IT systems to improve internal and external service delivery and to improve efficiency and effectiveness of operations in the Ministry. The strategy is aligned with the national water sector development strategy 2008 and national irrigation policy 2009 (Draft). Also the strategy is aligned with the National ICT policy 2003 and e-Government Strategy 2009 (Draft). The national e-government strategy has been developed as a higher-level plan to address the need and role of the application of Information and Communication Technologies (ICT) in improving government services for MDAs.

The ICT Strategy is intended to provide a framework for more coordinated and user driven focus on the use of IT systems as part of enabling the water and irrigation sectors development objectives and streamlining the implementation of e-Government Strategy. The ultimate goal shall be systematic ICT deployment within the water and irrigation sectors as a tool to facilitate the implementation of Water Sector Development Programme (WSDP) and Agricultural Sector Development Programme (ASDP). This is in terms of monitoring and evaluation as well as the overall capturing of data on water development and irrigation services countrywide. The strategy sets ambitious and specific goals and targets whose achievement will not only deliver better services to more citizens, but will also result in cost saving in the delivery of services while enabling many new types of services to be created as part of the water and irrigation sector development.

It is worth noting that this strategy will not only enable the Ministry to use ICT systematically, but also to apply ICT in reforming and improving the internal working processes, and ultimately making service delivery to the public easier and quicker. Similarly the strategy will ensure proper utilisation of public resources and avoid duplication of efforts in technology and service delivery.

Effective ICT Management requires people to deploy the right technology in the right way for the right reasons, commonly referred to as “people, process and technology”. This strategy explores these themes with a view to arriving at the best possible fit to ensure it is achieved. The strategy is a result of considerable effort made by a number of stakeholders working groups in which the challenges and opportunities facing the deployment of ICT in the Ministry and sector at large were explored. I would like to thank all involved exhausting and in providing the valuable inputs.

I now look forward to the delivery of commitments contained in the Strategy. Through this work, we can achieve a more integrated approach to the development and management of ICT and information systems as we strive to achieve our mission, goals and business strategies within the Water and Irrigation Sectors.

ENG. C.N. SAYI

PERMANENT SECRETARY

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The draft of the strategy was presented to a consultation workshop that comprised all Directors and Heads of units from the Ministry of Water and Irrigation as well as key principal and senior officers in the Ministry. Representatives of stakeholders were also drawn from other ministries, development partners, LGA's, DAWASA, DAWASCO, Basin Water Officers and non-governmental organisations that have interest in the water sector. These included representatives from GTZ, SNV, World Bank (IT Consultant for WB), Water Aid, JICA RUWASA CAD, TAWASANET, Energy and Water Utilities Regulatory Authority (EWURA), National Bureau of Statistics. Representatives of technology institutes were invited from Dar es Salaam University Computing Centre, Institute of Technology (DIT) and the Institute of Finance Management; also from private organisations included NPK Technologies and Geo Data Consultants Limited. Moreover in the workshop, Directors/Heads of MIS and ICT divisions were invited from the Ministry of Health and Social Welfare, Ministry of Lands and Human Settlement Development, Ministry of Finance and Economy, Prime Minister Office Regional Administration and Local Government, Ministry of Science, Technology and Communication; and the President's Office – Public Service Management.

The task force involved in the strategy preparation process wish to acknowledge the contributions from all parties involved. While the contributions helped in shaping the key issues, strategies, and conceptual framework for the specific solutions and sector MIS contained herein, the task force assumes the responsibility for any errors of omission or commission.

ACRONYMS

AHRMD	Administration and Human Resources Management Division
ASDP	Agricultural Sector Development Programme
CAD/CAM	Computer Aided Design/Computer Aided Maintenance
CBO	Community Based Organisation
CIA	Chief Internal Audit
COWSO	Community Owned Water Supply Organisation
CWSS	Commercial Water Supply and Sewerage Division
CWSSD	Community Water Supply Division
DAHR	Directorate of Administration and Human Resources Mgt
DAWASA	Dar Salaam Water and Sewerage Authority
DAWASCO	Dar Salaam Water Supply Company
DDCA	Drilling and Dam Construction Agency
DMS	Document Management System
DP	Development Partner
EIA	Environmental Impact Assessment
EWURA	Energy and Water Utilities Regulatory Authority
FAU	Finance and Accounts Unit
G2G	Government to Government
GIS	Geographic Information System
GoT	Government of Tanzania
GPS	Global Positioning System
GTZ	German Technical Cooperation
HQ	Head Quarters
IAU	Internal Audit Unit
ICT	Information and Communication Technologies
ICTU	Information and Communication Technologies Unit
IE	Implementing Entities
IECU	Information, Education and Communication Unit.
IT	Information Technology
ITSD	Irrigation and Technical Services Division
IWRM	Integrated Water Resources Management
JICA	Japanese International Cooperation Agency
LAN	Local Area Network
LGAs	Local Government Authorities
LOB	Line of Business
LSU	Legal Services Unit
M&E	Monitoring and Evaluation
MCS	Maji Central Stores
MDAs	Ministries, Departments and Agencies
MDGs	Millennium Development Goals
MIS	Management Information Systems
MISU	Management Information Systems Unit
MKUKUTA	Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania
MoWI	Ministry of Water and Irrigation

MTEF	Medium Term Expenditure Framework
NAWAPO	National Water Policy, 2002
NEMC	National Environmental Management Council
NGO	Non-governmental Organisation
NPES	National Poverty Eradication Strategy
NSGRP	National Strategy for Growth and Reduction of Poverty
NWSDS	National Water Sector Development Strategy
NWSSIP	National Water Sector Strategic Implementation Plan
ODBC	Open Database Connectivity
PDA	Personal Digital Assistant or Palmtop Computer
PMIS	Programme Management Information System
PMO-RALG	Prime Minister's Office - Regional Administration and Local Government
PMU	Procurement Management Unit
PO-PSM	President's Office – Public Service Management
PPD	Policy and Planning Division
PRS	Poverty Reduction Strategy
PSP	Private Sector Participation
PSRP	Public Sector Reform Programme
RWS	Rural Water Supply
RWSP	Rural Water Supply Programme
SDLC	System development Life Cycle
SLA	Service Level Agreement
SWAP	Sector Wide Approach to Planning
SWOT	Strength, Weaknesses, Opportunities and Threats
TAWASANET	Tanzania Water and Sanitation Network
TShs	Tanzanian Shillings
UWSA	Urban Water and Sanitation Authority
UWSSP	Urban Water and Sanitation Programme
VPN	Virtual Private Network
WAN	Wide Area Network
WB	World Bank
WCA	Water Consumers Association
WDMI	Water Development Management Institute
WLSD	Water Laboratory Services Division
WRM	Water Resources Management
WRMD	Water Resource Management Division
WRMP	Water Resources Management Programme
WSDP	Water Sector Development Strategy
WSS	Water Supply and Sanitation
WSSA	Water Supply and Sewerage Authority
WUA	Water Users Association
ZIO	Zonal Irrigation Office

EXECUTIVE SUMMARY

Information and Communication Technologies (ICT) Strategy 2010-2014 aims at guiding the deployment of ICT systems to improve internal and external service delivery and to improve efficiency and effectiveness of operations in the Ministry. The rationale behind the strategy includes:

- a) Planning strategically the ICT investment;
- b) Managing scarce ICT resources optimally;
- c) Prioritising ICT processes and projects based on what provides the most value;
- d) Measuring how well the Ministry is managing the portfolio to meet the Ministry's needs; and
- e) Instituting standards and minimise risks in ICT deployment in the Ministry.

The strategy is aligned with the national water sector development strategy 2008 and national irrigation policy 2009. Also it is aligned with the National ICT policy 2003 and e-Government Strategy 2009 (Draft). Based on national ICT policy, the national e-government strategy has been developed as a higher-level plan to address the need and role of the application of ICT in improving government services for MDAs.

The goal of the strategy is to enable systematic ICT deployment within the water and irrigation sectors as a tool to facilitate the implementation of Water Sector Development Services (WSDS) and Agricultural Sector Development Programme (ASDP). This is in terms of monitoring and evaluation as well as the overall capturing and use of the data on water development and irrigation services countrywide.

The ICT Vision for the Ministry is to deploy appropriate Information and Communication Technologies (ICT) as the enabler of its operations and quality service delivery within the next five years. The mission is to transform the Ministry of Water and Irrigation into a modern government entity that utilises state of the art technology to improve efficiency and effectiveness of its operations, delivering first class service to its stakeholders. The main goal is to ensure the Ministry has in place cost effective ICT services that will improve the Ministry's service delivery processes to support successful provision of water sector development and irrigation technical services based on the National Water strategy and Irrigation policy.

The ICT strategic objectives are to:

- a) Document and implement database management principles;
- b) Improve interaction with stakeholders;
- c) Implement the Conceptual Framework for specific solutions and Sector MIS to support business processes;
- d) Improve the technical infrastructure to facilitate communication and automation of key business functions;
- e) Build implementation capacities and change management; and
- f) Manage-ICT use and security issues in a comprehensive and coordinated way.

Each strategic objective is translated into implementation strategies and plans. The strategies are categorised into ICT Architecture as follows:

- a) Data and Information Strategy;
- b) Public Access Strategy;
- c) Business applications Strategy;
- d) Hardware and communication strategy;
- e) ICT Governance and Capacity Building Strategy; and
- f) Policies, Procedures and Processes.

The guiding principles for deployment of systems or applications in the Ministry are enshrined in the following policy statements:

- (a) All IT systems are developed with technical coordination from Ministry's ICT Unit and functionally by respective departments/units;
- (b) Systems and databases are owned and managed by the Ministry and if outsourcing of the said service required, there must be agreed contractual obligations between MOWI and the service provider;
- (c) Systems are developed based on the System Development Life Cycle (SDLC) and databases are compatible with ODBC connectivity and all documentations made be available to MOWI;
- (d) Systems run in a secured environment and Systems are functional in a supported environment;
- (e) Systems developments are compliant to standards and common platform for interoperability and smooth maintenance by MOWI;
- (f) Systems developed are interoperable with relevant tools;
- (g) Systems developed conform to a common data model and a sound systems architecture;
- (h) Proprietary and Open source systems are deployed based on approval from coordinating authorities based on regulations, guidelines, and Public Service Circulars issued regularly;
- (i) Users are involved during systems development life cycle; and
- (j) Data is owned and managed by users.

From the strategic visioning presented above, and based on the information requirements, the high level systems requirements that are components of the overall Ministry's ICT applications and solutions were identified. The core systems include:

- a) Geographic Information System;
- b) Water Sector Monitoring and Evaluation System;
- c) Integrated Irrigation Database;
- d) Commercial Water Supply and Sewerage System;

- e) Community Water Supply Infrastructure Monitoring System;
- f) Water Resource Management and Monitoring System; and
- g) National Water Quality Management and Monitoring System.

Support systems identified include:

- a) Workflow and Document Management System;
- b) Procurement and Contract Management System;
- c) Assets Management Information System;
- d) Human Capital Management Information System;
- e) Project and Financial Management Information System;
- f) IT Help desk support system;
- g) System for Public Information Dissemination (One stop information centre);
- h) General and Specialized Applications ; and
- i) Operating systems.

Also identified are systems for affiliated agencies and entities and the ones to be supported in terms of ICT shall include:

- a) Maintenance Management Systems;
- b) Human Capital Information Database;
- c) Financial Management System; and
- d) Integrated Customer Database.

The successful deployment of ICT in the Ministry requires a high level of coordination, a constant demand of tangible results, proactive leadership and strong management. There are always a number of critical success factors and risks associated with ICT implementation. These include:

- a) Management support and commitment;
- b) ICT leadership;
- c) Human Resource capacity;
- d) Effective communication among IT and business and down to lower levels;
- e) Consolidated IT structures to ensure responsiveness and accountability;
- f) Institutional and Legal Framework;
- g) Financial Resources;
- h) Commitment by all actors; and
- i) Sustainable Infrastructure.

There are a number of risks and dependencies that may affect the successful implementation of this strategy. Possible risks identified include:

- a) Donor dependence;

- b) Resource un-availability;
- c) Lack of Management Commitment and support;
- d) Resistance to change;
- e) Poor data quality; and
- f) Stakeholders with different objectives.
- g) IT structure that is not strong enough (e.g. unit instead of Department/division)

Some of the technological risks include:

- a) Technological failure;
- b) Technological obsolescence;
- c) Privacy and security issues; and
- d) Dependence on a single technology supplier.

The strategy provides some mitigation measures that aim at minimising the impact of these risks. It is expected that the ICT strategy will be implemented in five year period based Medium Term Expenditure Framework (MTEF), between the years 2010/11 to 2014/15. The implementation plan and means of monitoring are provided; depicting the logical sequencing of activities, responsibilities and timing of implementation.

CHAPTER 1: BACKGROUND

1.1 Introduction

ICT is an acronym for Information and Communication Technologies. The term encompasses a range of computing and communications technologies for capturing, manipulating, storing, retrieving, processing, analyzing and transmitting information. There is no universally accepted definition of term owing to the fact that the concepts, methods and applications involved in ICT are constantly evolving in line with the fast pace of change in technology itself. A simple definition is thus derived by considering all the uses of digital technology that help individuals, businesses and organisations use information to solve practical problems.

In business, ICT comprises traditional computer-based technologies - things you can typically do on a personal computer or using computers at home or at work; and the more recent, and fast-growing range of digital communication technologies including mobile phones - which allow people and organisations to communicate and share information digitally.

The 'C' part of ICT refers to the communication of data by electronic means, usually over some distance. This is often achieved via networks of sending and receiving equipment, wires and satellite links. The technologies involved in communication tend to be complex. However, there are aspects of digital communications that user's needs to be aware of. These relate primarily to the types of network and the ways of connecting to the Internet.

- a) **Internal networks:** Usually referred to as local area networks (LAN), this involves linking a number of hardware items (input and output devices plus computer processing) together within an office or building. The aim of a LAN is to be able to share hardware facilities such as printers or scanners, software applications, data and information. This type of network is invaluable in the office environment where colleagues need to have access to common data or applications;
- b) **External networks:** Often needed for communication outside internal networks; Links to internal network form the Wide Area Network (WAN); and
- c) **Internet:** Referred to as the network of networks, linking various standalone computers to internal networks and wide area networks across the world.

ICT in a Broader Context

ICT also takes into consideration some aspects that may not be directly technological, but inform how technology is harnessed to achieve business objectives. These include:

- a) Information (the "I" in ICT); covering such aspects as the nature of information, meaning and value of information; how information is controlled; and legal aspects of information;
- b) Management of information - this covers how data is captured, verified and stored for effective use; the manipulation, processing and distribution of information; keeping information secure; designing networks to share information; and
- c) Strategies and policies – covering the aspects of how ICT should be used to achieve organisational goals and objectives; policies guiding the management of ICT, and guidelines on how to use ICT with optimal effectiveness and efficiency.

1.2. Rationale for the ICT Strategy

In this strategy, the wider context of technology that encompasses Information and Communication Technologies (ICT) as well as Information Systems (IS) is adopted in order to serve the purpose of systematic deployment of the Information and Communication Technologies and IT systems in particular. The use of ICT in the Ministry therefore intended to optimise performance, improve cost effectiveness; and enhance quality and speed in services delivery. The Ministry will endeavour to provide the following:

- (a) Planning strategically the ICT investment;
- (b) Managing scarce ICT resources optimally;
- (c) Prioritising ICT processes and projects based on what provides the most value;
- (d) Measuring how well the Ministry is managing the portfolio to meet the Ministry's needs; and
- (e) Instituting standards and minimise risks in ICT deployment in the Ministry.

The ICT Strategy establishes a framework in which to fit the existing and proposed solutions, infrastructure investments and determines a framework for setting priorities. It also identifies the core systems and supporting resources and investment required over the medium term, it identifies the management and technical policies that determine the means and the ground rules by which information systems will be developed and managed. The strategy also outlines the migration plan needed to carry the work forward.

1.3. Ministry's Organisational Profile

The Ministry of Water and Irrigation is mandated with the task of managing water resources and providing technical services to develop irrigation in the United Republic of Tanzania. The approved organization structure of the Ministry of Water and Irrigation (2006) consists of the following divisions and units:

- 1) Water Resource Management Division;
- 2) Commercial Water Supply and Sewerage Division;
- 3) Community Water Supply Division;
- 4) Irrigation and Technical Services Division;
- 5) Water Laboratory Services Division;
- 6) Administration and Human Resources Management Division;
- 7) Policy and Planning Division;
- 8) Finance and Accounts Unit;
- 9) Internal Audit Unit;
- 10) Legal Services Unit;
- 11) Procurement Management Unit;
- 12) Maji Central Stores;
- 13) Information and Communication Technology Unit; and
- 14) Information, Education and Communication Unit.

The following agencies are also under the Ministry of Water and Irrigation:

- 1) Water Development and Management Institute; and
- 2) Drilling and Dam Construction Agency.

The new institutional framework for MOWI has necessitated movement of staff from the Ministry's headquarters to levels where functions and responsibilities have been devolved and the Ministry remains with a coordination role and policy formulation. The implication of institutional framework in ICT strategic planning and deployment is that data and information ownership should be devolved to the appropriate level; and consolidated upwards to support decision making in coordination of water sector development and irrigation technical services country wide.

1.4. Basis for the MOWI ICT Strategy

This ICT strategy articulates the approach to be adopted by the Ministry of Water and Irrigation to support its sectoral policies and strategies by use of ICT. Its development is based on the required alignment with ministry's Policies and Strategies, National Strategy for Growth and Reduction of Poverty (NSGRP) and Public Sector Reform Programmes. Also it is based on relevant policies, strategies and targets prescribed by the national ICT policy 2003 and e-government strategy 2009.

1.4.1. Alignment with Ministry's related Strategies and Policies

The National Strategy for Growth and Reduction of Poverty (NSGRP) sets operational goals and puts policy in a functional framework, which in the water sector is embodied in the National Water Sector Development Strategy 2006 – 2015 (NWSDS). The NWSDS guides the formulation of the Water Sector Development Programme (WSDP). The preparation process of the three sub-sector programmes: the Rural Water Supply and Sanitation Programme (RWSSP), the Urban Water and Sewerage Programme (UWSSP)¹, and the Water Resources Management Programme (WRMP) were guided by the NWSDS. The merger of the Irrigation and Technical Services Division into the Ministry of Water brings in the irrigation sector, which has a separate policy and strategies. The draft national irrigation policy states the vision as "A sustainable and dynamic irrigation sector that is a driving force in transforming agriculture into a stable, highly productive, modernised, commercial, competitive and diversified sector which generates higher incomes; increases food security and stimulates economic growth". The mission is therefore to facilitate a participatory demand driven irrigation development through Integrated Water Resources Management to enhance water use efficiency for increased and sustainable agricultural production, productivity and profitability to ensure food security, poverty reduction, and national economic development.

1.4.2. Alignment with Public Sector Reform Programmes

The second phase of the Public Sector Reform Programme (PSRP II) aims to harness the potential of ICT in service delivery. The programme identifies the following opportunities in harnessing ICT:

¹ National Water Policy 2003, Ministry of Water and Irrigation

- a) In line with the public service all over the world, it is being increasingly expected to be accountable for results and to report these results to the public. This also includes increased demands on how government funds are spent and what effect these expenditures have on service delivery and welfare; and
- b) The ICT revolution is offering tremendous opportunities to governments to reduce operational expenditures while improving the efficiency of their internal operations, their ability to interface and relate to citizens in terms of information as well as access and quality of services.

In light of the above observation, the PSRP II aims to put in place systems, processes and structures that enable each MDA to develop the capacity and perform efficiently and effectively in service delivery. To achieve this goal, the following outcomes are planned:

- a) Reduced bureaucracy and red tape in the delivery of services;
- b) Improved systems and structures to enhance access and efficiency of service delivery;
- c) Efficient delivery of internal operational and administrative services in MDAs; and Improved management of information that supports service delivery.

Some of the broad interventions required to achieve the planned outcomes are promotion of e-government and knowledge management systems; and improve the management of records that support service delivery. The ICT strategic objectives for the Ministry of Water and Irrigation takes into consideration these (PSRP II) broad interventions.

1.4.3. Alignment with National e-Government Strategy

The E-Government Strategy in Tanzania aims to “Deliver quality services to the public through technology”. With that intention, e-Government involves using ICT to support processes within the government (G2G) as well as for the delivery of services to beneficiaries, such as citizens, businesses and other organizations in all sectors².

The e-Government Strategy specifies seven guiding principles for developing initiatives and services. These are:

- a) **Service Innovation:** The use of e-Government must be geared towards introducing new work methods by creating new operational processes and changing current processes, as well as by changing the government's relationship with the public. Any such innovations must clearly identify resource requirements for sustainable operations. It requires continuous research, development and M&E;
- b) **Equal Access:** The implementation of ICT in government processes must ensure that all citizens will have equal access; for this purpose, factors such as geographic location, the issue of time, and diversity must be taken into account. It requires developing shared internal facilities that will enable service delivery channels to be available across the general public;
- c) **Ease of use:** Applications that are to be implemented must be oriented towards citizens and, hence, be user friendly. It requires providing user-friendly Citizen-Care and Business-Centric services for all;

² Tanzania National e-Government Strategy, President's Office – Public Service Management, Dec. 2008

- d) **Benefit Realization:** Applications should ensure that the benefits obtained by citizens from using e-Government services will be greater than those from visiting government offices in person. Therefore, e-Government investments need to be justifiable in terms of how they help citizens and taxpayers. It requires ensuring services are aligned to client expectations and address pertinent needs;
- e) **Security and privacy:** When implementing applications, consideration should be given to using security and privacy mechanisms to ensure the proper use and handling of personal information and transactions. It requires assuring security, legality, protection of privacy, prevention of intrusion and detection of attempts at unauthorised access;
- f) **Partnership and Involvement of all stakeholders:** The private sector can assist the State in providing e-Government solutions, as well as in training government employees. It requires building strategic partnership with private sector stakeholders and encouraging private-sector led innovations in delivering public services; and
- g) **Interoperability:** Each government department will be responsible for maintaining its electronic services and data sets, as well as for ensuring that newly implemented systems leverage existing systems and are aligned to the principle of Open Access. This requires holistic oversight and management of systems with broad participatory design processes for new systems.

The implication of these principles on the ICT strategy for the Ministry of Water and Irrigation is that the ICT infrastructure for the Ministry will be designed to:

- a) Streamline business processes through use of technology to improve service delivery;
- b) Systems are designed as part of the government-wide information systems in terms of inter-operability;
- c) Information access is readily provided to citizen in an easy to use and with consideration to security and privacy; and
- d) The information is shared within the Ministry for decision-making.

These considerations inform the strategic visioning of the Information and Communication Technologies for the Ministry of Water and Irrigation.

1.5. SWOT Analysis

A SWOT analysis was carried out to evaluate the issues in ICT development for the Ministry and to develop strategies for action. The highlights of the SWOT analysis are shown in the matrix below.

Table 1.5 SWOT Analysis

		Strategies
Strengths	The Ministry has the National Water Policy (NAWAPO) 2002 and strategy 2008 that recognised the importance of having a performance monitoring and evaluation tool	The ICT Strategy to include design for systematic and coordinated deployment of monitoring and evaluation system

		Strategies
	Existence of an ICT Unit at the Ministry to provide coordination, expertise and support in the systematic deployment of ICT systems	<ul style="list-style-type: none"> • To take advantage of the existing staff in the Ministry and retain them • Capacity building through general and specialised Management and ICT training to enhance capability to support new Ministry-wide systems • Future Upgrade of the ICT Unit into Division based on the anticipated services in supporting and managing the deployment and use of ICT and MIS sector wide
	The existence of good collaboration with development partners under Water Sector Development Programme (WSDP), which is supporting the initiation and implementation of Management Information (MIS) and capacity building for the same.	<ul style="list-style-type: none"> • To take advantage of support from development partners to establish computer based and MIS in a systematic and sustainable manner • To avoid duplication of efforts and utilise in a cost effective manner the scarce resources available.
	Strong commitment from the Ministry in relation to budgetary resources	To avoid duplication of expenditure and utilise the same in a cost effective manner
	The availability of standalone systems in various departments and units	Integrate the technologies used in order to make the available stand alone systems sharable
	Difficulty in accessing the different existing information from the Ministry or from respective departments, units and agencies	<ul style="list-style-type: none"> • Design ICT architecture to ensure data sharing between divisions, units, agencies and taking into consideration other stakeholders requirements
Weaknesses	Incompatibility and non-linkages between various databases in the Ministry and most of the data sets are incomplete, outdated or unavailable	<ul style="list-style-type: none"> • Ministry-wide definition of datasets by all the data stakeholders To undertake Capacity building to ensure that the resources are available for update of data and related information
	Lack of cross skilling within the Ministry	<ul style="list-style-type: none"> • Establish cross skilling mechanisms
	Lack of consistency with respect to deployment and management of ICT and information systems in the Ministry	Establish a strategy for systematic management and deployment of information systems in the Ministry and the same to be coordinated by ICT Unit. This means adherence to the Ministry's organization structure that spells out clearly functions of ICT Unit.
	Lack of district plans for monitoring and evaluation and capacity to sustain information systems	Design of WSDS Monitoring and Evaluation Systems will include capacity building for the districts and other sources of data

		Strategies
	High operational costs	<ul style="list-style-type: none"> Using automation of the office workflow, reduce stationary and equipment maintenance costs by 15% pa <p>Expand the WAN to include both data and voice communication to reduce telephony costs</p>
	Weak customer service	<ul style="list-style-type: none"> Implement an intranet portal to hasten information sharing flow Computerise all the business processes Establish front office with an electronic information flow Develop a dynamic Website to increase global reach and access to water sector information Implement electronic feedback forms to capture enquires
	Non-allocation of local funds for ICT/MIS projects and non activity based budgeting.	<ul style="list-style-type: none"> Allocate local funds for ICT/MIS projects instead of depending 100% on foreign funds under WSDP Activity based budgeting to be emphasised for ICT/MIS projects in the Ministry.
	Availability of standalone databases or ICT systems in each department or unit	<ul style="list-style-type: none"> Harmonise the M&E system to enable Ministry-wide consolidation Based on the existing efforts, harmonise technologies used in the existing databases and ICT systems to enable interoperability and data sharing
	Each department of the Ministry is partly networked for Internet facilities but there exist no intranet services that enable sharing of information resources	<ul style="list-style-type: none"> Explore ways of consolidating Internet provisions to take into consideration economy of scale, security and contingency planning. Establish Ministry wide networking to enable the deployment of Intranet and Extranet services for improved data and information sharing.
	The availability of standalone systems in various departments and units	<ul style="list-style-type: none"> Integrate the technologies used in order to make the available stand alone systems sharable
	There are thousands of manual based records in the Ministry	<ul style="list-style-type: none"> To computerise all manual based records and documents in the Ministry to facilitate access and easy retrieval as an improvement of the services delivery

		Strategies
	The existence of various reforms that are taking place in the government MDA's such as Public Service Reform Programme and Local Government Reform Programme.	<ul style="list-style-type: none"> • Take advantage of the existing reforms in government MDA's to improve services delivery through ICT • Position MoWI as a model and pilot for implementing ICT related projects of PSRP
Opportunities	Commitment under MKUKUTA to strengthen MIS, also support provided by PSRP II and National e-Government Strategy	• Align the MoWI ICT Strategy with PSRP aspiration and the National e-government strategic framework
	Joint Assistance Strategy (JAS) is committed to support monitoring and reporting on Water Sector performance	Proper planning for utilisation of JAS resources through ICT strategic planning
	Availability of National ICT Policy and e-Government Strategy	Using the political support in sourcing the resources and deployment of ICT through National ICT projects/initiatives
	The existing modern technology base can be exploited	Exploit the available modern technology base
	The intended availability of reliable internet connectivity through marine fiber optic and national fiber optic backbone with faster and cheaper bandwidth	Exploit fibre based internet/WAN connectivity services
	ICT innovation perceived as a way to provide better services can change the way business and services are provided by the Ministry	Try as much as possible to deploy ICT as a solution for service delivery.
	Increasing ICT literacy of users	Try as much as possible to deploy ICT as a solution for service delivery.
	Fragile Institutional link (district-region-national levels)	Enhance system ownership at the lowest possible point and ensure automated transfer of data to the Ministry level
Threats	Financial resources available are scattered to support ICT and MIS activities.	Provide clear ICT and MIS project charters and investment plans for budgeting and sourcing joint assistance funding
	Lack of adequate human resources to manage ICT and MIS activities at BWO's, ZIO, LGA's, Small Towns, and UWSSA	Ensure that there are professional ICT and MIS personnel at BWO's, ZIO, LGA's, Small Towns, and UWSSA.
	Donor driven ICT projects that may not be sustainable	To develop ICT systems that is demand driven by users and owned by the Ministry for sustainability. Focus on ICT strategy
	The absence of Documentations for the existing ICT Systems in the Ministry	Adhere to systems development and management methodologies/best practices in which documentation is a prerequisite for further monitoring , maintenance and troubleshooting

		Strategies
	Service departments and units making decisions and commitments without consultation with ICT Unit may result into inconsistencies in IT systems deployments	Establish mechanisms for consultations with ICT Unit for businesses related to IT Systems
	Increasingly sophisticated security risks and threats	<ul style="list-style-type: none"> • Prepare and deploy Information security policy and business continuity plan. • Design and implement disaster recovery plans

CHAPTER 2: VISION, MISSION, GOAL & OBJECTIVES

2.1. Mission, Vision, Goal

Vision

The Ministry of Water and Irrigation will deploy the appropriate Information and Communication Technologies (ICT) as the enabler of its operations and quality service delivery within the next five years.

Mission

To transform the Ministry of Water and Irrigation into a modern government entity that utilises state of the art technology to improve efficiency and effectiveness of its operations, delivering first class service to its stakeholders.

Goal

To ensure the Ministry has in place cost effective ICT services that will improve the Ministry's service delivery processes to support successful provision of water sector development and irrigation technical services based on the National Water strategy and Irrigation policy.

2.2. Policy Statements on ICT Systems Deployment

The following statements shall be the guiding principles for deployment of ICT systems or applications in the Ministry:

- a) All IT systems are developed with technical coordination from Ministry's ICT Unit and functionally by respective departments/units;
- b) Systems and databases are owned and managed by the Ministry and if outsourcing of the said service required, there must be agreed contractual obligations between MOWI and the service provider;
- c) Systems are developed based on the SDLC and databases are compatible with ODBC connectivity and all documentations made be available to MOWI;
- d) Systems run in a secured environment and Systems are functional in a supported environment;
- e) Systems developments are compliant to standards and common platform for interoperability and smooth maintenance by MOWI;
- f) Systems developed are interoperable with relevant tools;
- g) Systems developed conform to a common data model and a sound systems architecture;
- h) Proprietary and Open source systems are deployed based on approval from coordinating authorities based on regulations, guidelines, and Public Service Circulars issued regularly;
- i) Users are involved during systems development life cycle; and
- j) Data are owned and managed by users.

2.3. Strategic Objectives

To address the existing challenges and fulfil the vision and mission, the Ministry is adopting six strategic objectives that will be achieved by focusing on the continuous development of its people, processes and technologies.

- a) Objective 1: Document and implement database management principles;
- b) Objective 2: Improve interaction with stakeholders through ICT;
- c) Objective 3: Implement the Conceptual Framework for specific solutions and Sector MIS to support business processes;
- d) Objective 4: Improve the technical infrastructure to facilitate communication and automation of key business functions;
- e) Objective 5: Build ICT implementation capacities and change management; and
- f) Objective 6: Manage ICT use and security issues in a comprehensive and coordinated way.

The strategic objectives are further discussed in the strategies for implementation in Chapter 3 of this document. Each strategic objective is translated into implementation strategies and plans. The strategies are categorised into ICT Architecture as follows:

- a) Data and Information Strategy;
- b) Public Access Strategy;
- c) Business applications Strategy;
- d) Hardware and communication strategy;
- e) ICT Governance and Capacity Building Strategy; and
- f) Policies, Procedures and Processes.

CHAPTER 3: ICT STRATEGIES

3.1. Data and Information Strategy

Improved information availability provides a breakthrough in the levels of productivity, quality and improved customer service level. The strategic objectives shall be achieved within specified time but through milestones within that period.

Current Situation and Issues

Currently the main issue lies with the quality of data obtained which reflects in the quality of information provided for decision making. Some of the issues are:

- (a) Each division collects its own data, often from the same source, at different times;
- (b) Incompatibility and non-linkages between various databases in the Ministry and most of the data sets are incomplete, outdated or unavailable;
- (c) Data is captured in physical form, consolidated upwards up to the headquarter level where it is entered into electronic database hence affecting the currency and correctness of the data; and
- (d) Information generated by the databases that are implemented at the headquarters is not available for decision making at the lower levels.

Strategies

- a) Each database developed in the Ministry is designed taking into consideration all stakeholders within the water and irrigation sectors. These would include sources of data, key users of the information, and clients for the information to be generated by the database;
- b) Whenever possible, data and information interchange is achieved electronically, as a way of improving efficiency, but also as a way of ensuring single source of each data set or information to enhance integrity;
- c) Databases are managed by database owners. The main thrust is to centralise each specific database to the key user entity (ownership by the key user) and decentralise its access to data entry points (information/data suppliers) and to other information users (information clients);
- d) Identifying databases used by Ministry entities that could suit other entities;
- e) Sustainability of the databases through centralised technical support, particularly databases developed as part of projects or programmes should not become obsolete at the end of such projects;
- f) Data capture equipment, such as computers, PDAs and the like will be used to capture data at source and entered at the lowest administrative point possible (the databases will be located at centres such as Basin Water offices, Zonal Irrigation offices, Zonal Water Quality Laboratories, local governments, or schemes etc.);
- g) Whenever possible web-based databases will be implemented to enable remote centres to access them;

- h) The design of the systems is done such that the primary user (district officials, zonal irrigation officials, water basin officials etc) enters data rather than submitting hard copies of the same to the Ministry; and
- i) Providing centralised contingency measures for all systems that form the Sectors MIS.

Strategic Objective 1: Documentation of Database Management Principles

No	Key Result Area	Summary Main Activities	Timescale
1.1	Information sharing, efficiency and effectiveness of IT processes	Develop guidelines for business process re-engineering	Short Term
		Document systems development guidelines	
		Identify systems that can be shared by different entities in the Ministry	
		Assess type of system support to be provided by MOWI ICT Unit and that may be outsourced	
1.2	Database ownerships	Identify key users of each existing database	Short to Medium Term
		Identify information clients	
		Design the approach for linking the databases or electronic publishing of outputs from databases	
1.3	Standardisation of definition of datasets for interoperability and coordinated Monitoring and Evaluation purposes	Identify categories of data	Short to Medium Term
		Agree on dataset definitions	
		Develop sector wide data Models	

3.2. Public Access Strategy

The prime target of information is to improve service delivery to the citizen. Therefore, technology should be employed to improve the interaction between the Ministry and its stakeholders whenever and wherever possible.

Current Situation and Issues

Traditionally, the Ministry works through papers, request for services or information by internal and external customers is done through letter communication or through completion of forms and other requisitions. The result of this process is the delays in providing services to the public. Although the Ministry has substantial information for public consumption, this is not made available because of the cost of publishing the same.

Strategies

The strategic actions to be taken to address the challenges are:

- a) All forms for service request will be made available in hard copy as well as on websites, and whenever possible dynamic databases should be developed so that forms are completed on-line;
- b) All public information that is usually requested by and provided to the general public through calls, written requests or physical visits to the Ministry's offices shall be made

available on the Ministry’s website, affiliated agencies or authorities and where possible through mobile phone access;

- c) The webmasters and/or divisional dedicated database staff will regularly keep the websites and databases updated, and ensure completed forms are channelled to responsible personnel and that response to the forms and queries are made in a timely manner, either on-line or by any other means possible; and
- d) The Ministry shall describe what information, service or products can be provided by the Ministry to the public and other stakeholders; how the public can access such information, service or products and whether such is for free or for fee.

Strategic Objective 2: Improve Interaction with Stakeholders

No	Key Result Area	Summary Main Activities	Timescale
2.1	Customer Service management system (including complaints issues)	Identify information demands for internal and external customers	Medium to Long Term
		Identify forms for online uses	
		Identify information for the public	
		Prepare requirement document (functional and non functional)	
		Design and develop website portal /mobile phone interface	
		Train technical staff and all users	
		Support implementation activities	
		Support post implementation activities	

3.3. Business Applications Strategy

The role of applications or information systems in the Ministry is shifting to support business processes rather than individual functions. The focus is outwards to customers, rather than inwards to procedures. Services are as important as products. The role of Ministry in coordinating irrigation and water sector development services are increasing more and more rapidly. This poses a challenge to existing information systems, which are often inappropriately structured to meet these needs. It also poses a challenge to the people who design, work with, and use these systems, since they may hold outdated assumptions.

Issues and Current Situation

- a) Absence of Information Management/Technology Policy: Even though the country of Tanzania has a national ICT policy, the Ministry of Water and Irrigation does not have an instituted Information Management Policy tailored sector use;
- b) Absence of Information Management/Technology Standards: The absence of Sector standards on IT systems is partly responsible for the existence of the many standalone systems in the MoWI enterprise. These systems are hence developed using difference standards, some of which are proprietary, and are often not interoperable. As a result systems that captures and stores functionally related data cannot interact with each other, causing inherent duplication of data in the enterprise. In the absence of a standard, systems in the enterprise posses different data structure, different data definition, different data models, different architecture, inconsistent business rules and produces inconsistent reports;

- c) Absence of Information Technology architecture within the Sector to support its mandate: The current information management environment needs to be improved to accommodate the dynamic nature of the business of the Sector. The ICT Unit of MoWI needs to have a better management over sight of all systems in the enterprise;
- d) Inadequate ICT/Business Skills: The Sectors seriously lacks adequately trained MIS personnel to take on the required IT mission. MoWI has the staff but their skills levels require sharpening in order to stay abreast with technology in relation to current business needs;
- e) Presence of poorly designed systems: The Sector, even though has some functional systems, still possesses some unreliable applications. Some of the system uses flat files as their data source. Many of the current systems in place appear to be an afterthought. They lack structure, functionality and are poorly designed hence cannot meet the demand of the enterprise. Since reliable data collection cannot be assured due to the challenges stated above, the integrity of the resulting reports can certainly not be assured;
- f) Data Models: The existing systems do not have documented data models. However a review of the systems clearly suggested that many of them were based on flat files and other inappropriate structures. Based on this challenge credible data model is needed to be developed and used for the enterprise in order to be sure that systems built on that model will properly integrate.
- g) Business process re-engineering is needed to eliminate the information gaps from the enterprise: The current systems do not have appropriate checks and controls built in to ensure a complete execution of a function/business process. For example if a customer bill is not collected, the system does nothing to alert management. Systems do not execute appropriate alerts to ensure that it is brought to management's attention for action to be taken. The record remains in the system forever or can be deleted by a staff. This is an example of a poorly designed system. The databases lack a built-in referential integrity and so associated data from other entities may not be unique – This problem could be explained by the business process that allows for not collecting customer billings because the water utilities are not sure if the water that was pumped to some distant locations actually reached consumers;
- h) Inadequate information gathering mechanism: The current method for gathering information needs a serious consideration. Given the vast geographic location that is covered by data collection and water supply points, a more realizable means of data collection should be considered. Currently data collection is not timely enough to be incorporated in reports. As a result reports are based on old or incomplete data hence cannot be reliable for decision support. Technology using GIS and portable devices, such as cell phones, should be considered for data collection; and
- i) Unreliable Power Supply: The power supply in the Sector is not reliable. Power supply from the electricity corporations are cut off sometimes without warning. Power failure can be responsible for the following: 1). Corruption of data during transmission, 2). Unavailability of the systems even in areas with power – if the server location has no power, 3). Risk crushing mission critical systems.

Strategies

- a) Sector to develop a statement or collection of statements that articulates the national ICT position along with a directive for field offices to comply with the national guidelines in order to ensure synergy at the national level. Such guideline shall be tailored to fit the unique needs of each entity;
- b) MoWI to develop and institutionalise ICT standard and procedures for all MIS activities in the Sector enterprise;
- c) The sector shall put in place adequate infrastructure and the necessary training and tools (such as standardised tools, applications and procedures) required to support and maintain the sector MIS environment;
- d) The Sector to embark on enhancement training activities for Sector ICT staff. This is necessary because technology changes very quickly and it is important that the MIS staff stay abreast with technology;
- e) The Sector to embark on efforts to train all ICT support staff to keep up with technology required to sustain and improve the ICT environment;
- f) MoWI to embark on an efforts to review all defined business processes with key consideration to re-engineering and policy definition and enhancements opportunity
 - a. Processes that do not add sufficient value to the strategic goal and initiatives shall be eliminated
 - b. Processes shall be modified if such modifications will increase value to the sector.
- g) MoWI to develop an enterprise architecture that will support information flow from and to all stakeholder appropriately;
- h) The Sector to review and integrate existing systems, where feasible, by developing relevant models that can support the various applications and further built relevant interfaces for the systems and users;
- i) The Sector to harmonise all systems on supported platforms for easy scalability, integration and interoperability. This effort will include development of new applications and data conversion efforts;
- j) MoWI to prepare appropriate tools to be deployed to the fields to ensure that data collection and information management are consistent with that at the nation level;
- k) MoWI to institute appropriate internal case management tools to track and support ICT and MIS cases till closure;
- l) MoWI to institute appropriate communication links, such as reliable support telephone access, emails, knowledgebase, websites etc, to ensure access for support by needing entities;
- m) To review and update all systems licenses and agreements with all vendors accordingly.

Strategic Objective 3: Implement Conceptual Framework for specific solutions and sector MIS to support business processes.

No	Key Result Area	Summary Main Activities	Timescale
3.1	Geographic Information System to facilitate the Management of infrastructures under water and irrigation development services	Identify GIS core data sets needed for water development services	Short to Medium Term
		Prepare GIS requirement document	
		Design and develop/acquire GIS to support water development services	
		Procure and install GIS Equipment and software	
		Train technical staff and all users	
		Support implementation activities	
		Support post implementation activities	
3.2	Integrated Water Resource Management Information System	Identify data and information needs for IWRM	Medium to Long Term
		Prepare IWRMS requirement document (functional and non functional)	
		Design and develop/acquire IWRM system based on the Ministry-wide core data model	
		Train technical staff and all users	
		Support implementation activities	
		Support post implementation activities	
3.3	Human Resources Management Information System	Identify the information needs for effective HRM	Short to medium Term
		Design and develop/acquire the system	
		Train technical staff and all users	
		Support implementation activities	
		Support post implementation activities	
		Roll-out to other implementing entities under MOWI	
3.4	Document Management System with Workflow	Improve file indexing system at the central file registry at Ministry HQ	Short to medium Term
		Replace the old files and make proper files arrangements at the Central File Registry, PMU, LU and all Departments/Units at the Ministry	
		Prepare requirement document for computerizing the system (functional and non functional)	
		Design and develop/acquire the system	
		Train technical staff and all users	
		Support implementation activities	
		Support post implementation	
3.5	Assets Management System	Prepare requirements for the system	Medium to Long Term
		Design and develop/acquire the system	
		Train users	
		Support implementation activities	
		Support post implementation	

No	Key Result Area	Summary Main Activities	Timescale
3.6	National Irrigation Database	Identify data and information needed for National Irrigation services	Short to medium Term
		Prepare requirement document (functional and non functional)	
		Design and develop/acquire system	
		Interface the system with other sub sector systems in the Ministry	
		Train technical staff and all users	
		Support implementation activities	
		Support post implementation activities	
3.7	Commercial Water Supply and Sewerage Information System	Identify data and information needed	Short to medium Term
		Prepare requirement document for the system (functional and non functional)	
		Design and develop/acquire system	
		Train users	
		Support implementation activities	
		Support post implementation activities	
3.8	National Rural Water Supply and Infrastructure Monitoring System	Identify data and information needs	Short to medium Term
		Prepare requirement document (functional and non functional)	
		Design and develop/acquire system	
		Undertake water point mapping	
		Train users	
		Support implementation activities	
		Support post implementation activities	
3.9	National water quality and monitoring system	Identify data and information needs	Short to medium Term
		Prepare requirement document (functional and non functional)	
		Design and develop/acquire system	
		Train users	
		Support implementation activities	
		Support post implementation activities	
3.10	Planning, budgeting and procurement system for WSDP	Requirements analysis	Short to medium Term
		Design and develop/acquire the system	
		Train users	
		Support implementation activities	
		Support post implementation activities	
3.11	Sector MIS Short term solutions – domain focused	Prepare and adopt the core data model – sector wide	Short Term
		Determine attributes for the core data model and determine data structure for each attribute	
		Standardise M&E templates across the sector	

No	Key Result Area	Summary Main Activities	Timescale
		M&E data collection across the sector	
3.12	Implement Sector MIS Mid-term track – Domain Focused but with a bit sector wide capabilities by 2011	Acquire technical support tool to track issues to closure – Sectors help desk system Provide computers for all who do not have computers Ensure that software versions are the same across the sector Developing business application environment policies and guidelines (train and institutionalise standards across the sector)	Medium Term
		Configure Network environment and setup file server to shared corporate assets – read only	
3.13	Implement Sector MIS Long-term track: - Sector wide focused by 2012	Requirement analysis to inspect existing systems; review their architecture; their models; drivers; interfaces; platforms; compliance, compatibility; maintainability and recommend enhancements. Perform Software Development Life Cycle activities concurrently Deploy sector MIS system Ensure that crossing activities are in place across the sector Ensure that common trends are in place across the sector	Long Term

3.4. Hardware and Communication Services Strategy

3.4.1 ICT Hardware Standards

Current Situation and Issues

The technology horizon is fast evolving, with a turnover in technology evolution of around 18 months. Currently, the Ministry does not have instituted ICT hardware standards and the result is having different hardware platforms which are not interoperable and create difficulties in support. For this reason, the Ministry's choice of technology will have long-view focus based on future trends rather than current ones.

Strategies

ICT Hardware will be based on standards prescribed by the relevant government body responsible for ICT Standards and based on the Ministry's information security policy to be developed. The strategic actions to be accomplished are:

- a) Standards shall be developed and all ICT hardware shall be procured network ready at delivery;
- b) Servers will be installed at the Ministry as file and application server, database server, web/Internet server and backup servers. The web/internet server will also provide for VPN link between locations. An additional servers will be installed as a database server at points where databases are located;

- c) There shall be off-campus backup servers for security purposes. A secure place will be identified;
- d) For each technology platform identified, the Ministry needs understanding the evolution of the platform and the relevance and value of their introduction to the Ministry ;
- e) Whenever possible, the Ministry will adopt open-source technology or any non-proprietary technology that is future proof but in consultation with PO-PSM ; and
- f) The ICT Unit shall be responsible for ensuring that ICT hardware standards are adhered to during procurement processes.

3.4.2 Local Area Networks

Current Situation and Issues

Installation of local area networks at the Ministry was previously undertaken as part of initiatives within divisions of the Ministry or as part of specific donor funded projects. As a result, the networks are of different designs and standards and are not linked to each other, thus minimising the benefits of sharing information electronically.

Strategies

There will be a Local Area Network (LAN) at the Head Quarters and at each satellite office. Also at all Basin Water Offices, Zonal Irrigation Offices, Water or Irrigation Scheme Offices, support to LGAs, and UWSSA. The strategic actions for local area networks to be achieved are:

- a) The Ministry's ICT Unit shall oversee design of LANs, WANs, Internet Provision, Intranet Provision, Website Design, Email Services, etc.;
- b) Each new building (e.g. Basin Water Offices, Zonal Irrigation Offices, and support to LGAs, WSSA and COWSOs etc) must include a Local Area Network as part of construction works. The minimum network standard must be Ethernet category six or higher as may be specified in government standards issued by the relevant body. Dual Port Points will be installed to serve for telephone and data; and
- c) The minimum network standards shall be as per standards provided by any government agency mandated to provide government standards as issued from time to time.

3.4.3 Wide Area Networks

Current Situation and Issues

Currently, the discrete networks at the Ministry and its agencies are not linked. Similarly, upcountry offices at Basin Water offices, Zonal Irrigation Offices, Regional Secretariats and district Water Engineers' Office and National Projects are not linked to the networks at the head offices resulting in physical transfer of data between them and between the offices and headquarters. As a consequence data may be corrupted and the general integrity of data is compromised.

Strategies

The strategic actions on WAN to be achieved are:

- a) The local area networks will all be linked to the Wide Area Network managed at the Ministry's Headquarters; and

- b) The WAN will be served by a Virtual Private Network (VPN) through Internet until the government independent network proposed in the e-Government strategy is in place. The Internet Link will be connected at headquarters through fiber technology adopted by the Government. Then one VPN links will be installed at the Head quarters, and one at each of the satellite LANs.

3.4.4 Internet and Intranet

Current Situation and Issues

There is no coordinated provision of Internet at the Ministry, with each division or unit making its own initiatives for the same. As a result the Ministry is not taking advantage of economies of scale and centralised internal support for the service. Also, there is no Ministry-wide Intranet that would enable staff in the Ministry to share documents, bulletin boards and other communication facilities.

Strategies

The Head office local area network will be installed essentially to facilitate the sharing of Internet broadband, intranet and provision of management information. The strategic actions to achieve this objective are:

- a) Documenting the objectives of the Ministry’s Internet and intranet and setting respective access privileges;
- b) Developing and deploying the intranet; and
- c) Building capacity for staff to utilise the Intranet for document and information sharing and Internet for access to web based ministry related systems and individual department/unit specific and general use.

Strategic Objective 4: Improve the technical infrastructure to facilitate electronic communication and automation of key business functions

No	Key Result Area	Summary Main Activities	Timescale
4.1	Standards for ICT Hardware and Software	Obtain government recommended standards	Short to medium Term
		Choose standard for each application in the Ministry	
		Sensitise users on selected standards	
		Train users on selected standards	
4.2	Improvement of ICT Infrastructure and backbone	Prepare and furnish server room	Short to medium Term
		Prepare and furnish IT support rooms	
		Procure and commission Central servers	
		Procure and commission Workstations	
		Procure and commission printers	
		Procure and commission power stabilizers	
		Design, configure, install and support LAN/WAN/Internet/Intranets and Extranets	

3.5. ICT Governance and Capacity Building Strategy

3.5.1. ICT Governance

The primary goals of ICT Governance are to assure that the investments in ICT generate business value, and to mitigate the risks that are associated with ICT. This can be done by implementing an organisational structure with well-defined roles for the responsibility of information, business processes, applications and infrastructure. ICT governance should be viewed as how ICT creates value that fits into the overall corporate governance strategy of the organisation, and never be seen as a discipline on its own. In taking this approach, all stakeholders would be required to participate in the decision making process. This creates a shared acceptance of responsibility for critical systems and ensures that ICT related decisions are made and driven by the business and not vice versa.

Issues and Current Situation

- a) There is no coordination of technology matters among business units: The various entities resort to using available tools to develop and create small database to do their work. This has resulted in many data bases with related data in the enterprise.
- b) There is unclear definition of relationships among MoWI business units, MOWI ICT Unit and External entities: There are several business units within MoWI. In addition MoWI has relationships with external entities such as the regional, urban and district water supply authorities in addition to EWURA and others. In order to establish a sound information management system the functions and relationship among all entities within the Sector must be clearly defined. Currently different business units within MoWI perform M&E activities and they do so without any set guidelines.
- c) The ICT Unit at the Ministry level was established and mandated to oversee and provide expertise and services to the Ministry on all ICT and e-Government deployments as well as undertaking research and studies so as to advise on areas for computerization and automation. The Ministry's ICT Unit as a central coordinating unit for all ICT activities is currently staffed with 14 members of staff.
- d) There exists a number of implementing agents, particularly in water supply, sanitation and sewerage. These include LGA's, Regional Administrative Secretary water offices, UWSSA's, Small Towns WSSA's and COWSO's. In addition, the Ministry is responsible for supporting agencies that report to the Ministry itself, including the Dam and Drilling Agency, and the Water Development and Management Institute.

Strategies

- a) There will be enhancement of MIS or database Sections at each level (Divisions at the headquarters; Basin Water Offices and Zonal Irrigation Offices);
- b) Data entry personnel in each implementing agency such as district water engineer's office to facilitate update of databases;
- c) The functions mandated for the Ministry's ICT Unit remains as approved in 2006. These include: Implement IT and e-government policy; Develop and Coordinate integrated MIS and IT systems for the Ministry; Ensure maintenance of hardware and software; Coordinate and provide support on procurement of software and hardware; Establish

and Coordinate use of email, LAN and WAN; and carryout studies to determine areas of use of ICT to improve service delivery;

- d) With the current technology available, many more proposed business applications and much needed alignment to business, the ICT Unit for the Ministry will be responsible for managing complex Ministry-wide data centre and its support to the business. The new and appropriate structure for the Unit is therefore proposed in the Strategy in order to effectively incorporate sub sections under the Unit that are necessary to coordinate each specific ICT areas; and
- e) Also the Ministry’s ICT Unit need to be upgraded into a Department/Division within the next five years given the earlier indicated expected expansion of ICT and its use across the Ministry in order to provide more coordinated efforts and effective distribution of responsibilities. The Internal Working Structure of the proposed ICT Unit is as indicated in Figure 3.5 and will remain the same during upgrade to the proposed full fledge department but the sub sections under the Unit should be enhanced and capacitated for respective functions.

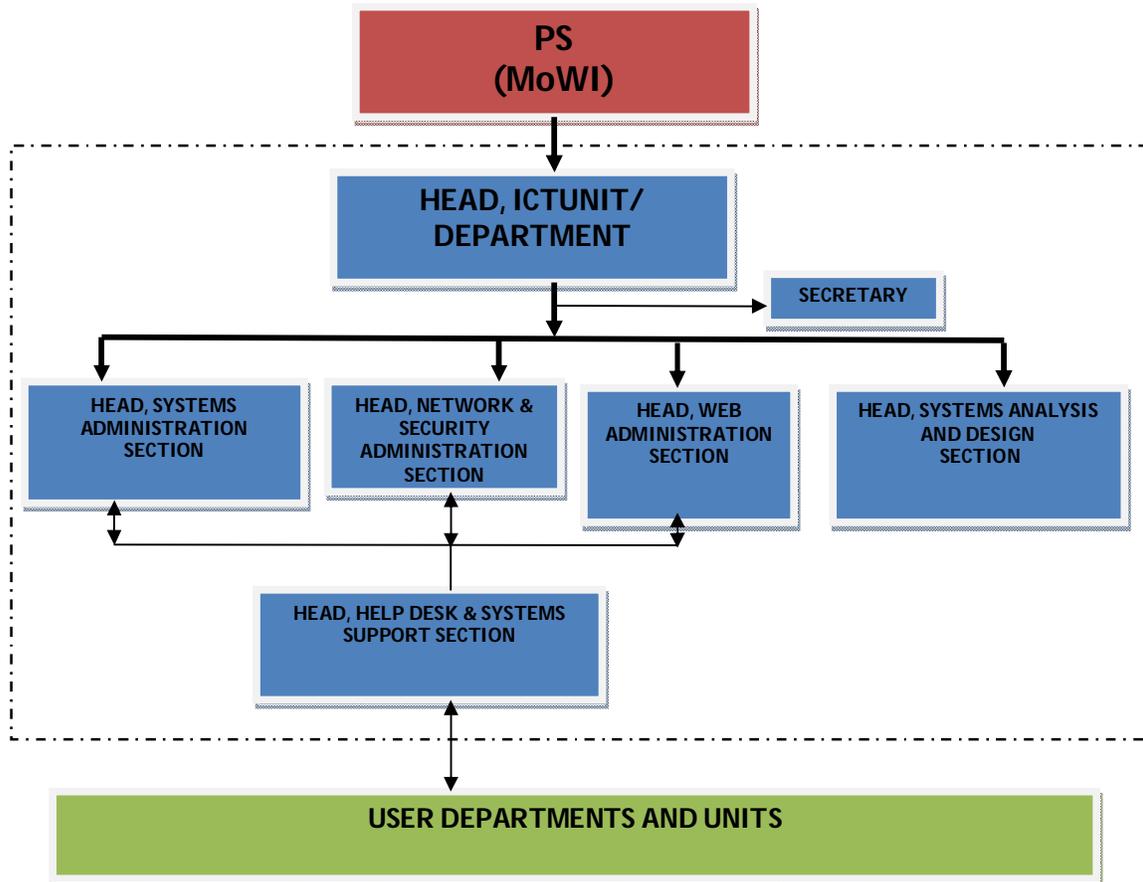


Figure 3.5: Proposed Functional Structure for the Ministry's ICT Unit/Department

3.5.1 Capacity Building

Current Situation and Issues

A survey conducted to establish ICT literacy at the headquarters shows that the literacy ranges from 81% for word-processing, 85% for spreadsheet, 63% for presentation software, 63% for internet, and 44% for database management. While in many application systems staff have the basic skills, the area of concern is for applications that are key to the Ministry's business. These are:

- a) Document Management Systems: Knowledge in document management currently stands at 8% of staff who should be using it. Document management system cuts across all departments and all officials should be able to use the system;
- b) Geographic Information Systems: The knowledge in departments that use spatial data is 14% at basic level, 10% at medium level and 6% at advanced skills. GIS is one of the key applications in all the Ministry's programmes as planning and operations, also monitoring the programmes depend heavily on spatial data;
- c) Monitoring and evaluation system: knowledge of M&E system stands at 17% of all officials who should use the system. This may be explained by the fact that a computerised M&E system has not been put in place. This also applies to unavailability of a systematic M&E system in manual basis;
- d) The current ICT unit has qualified staff with substantial experience in various ICT fields, and an impressive initiative is that these members of staff are now undergoing extra specialised professional qualifications that lead to certifications such as MCSE, CISCO, LINUX, IS and business management, etc;
- e) Change management is one of the key issues determined since a big number of employees still use manual processes instead of available technologies in place at the Ministry. There is a need of change management programme that geared staff towards the effective use of technologies in place.
- f) Some application systems are only relevant to particular technical areas, for example computer aided design (CAD/CAM) is more relevant to engineering departments while GIS is more relevant to departments that utilise spatial data; therefore literacy in such cases are based on relevant user departments.

Strategies

The strategic actions for capacity building are:

- a) To achieve 100% for basic computer knowledge and internet/intranet usage for all employees in the Ministry. All officials who require information from specialised databases should be able to access the information directly;
- b) All members of staff should be able to use the Workflow and Document Management Systems to access documents stored therein in line with access privileges set;
- c) All technical staff, e.g. water engineers, draughtsmen, planners etc, should be trained at medium to high level in Geographic Information Systems, Computer aided design and monitoring and evaluation systems and other specialised ICT training based on their area of usage of the systems;

- d) Personnel at the Ministry's ICT Unit and in database sections of divisions should be provided with professional ICT Courses; and
- e) Each system to be implemented will consist of a capacity-building component to address skills gap and to facilitate change management for process re-engineering.

Strategic Objective 5: Build ICT implementation capacities and change management

This strategic objective will facilitate smooth management and operationalisation of the IT resources and applications

No	Key Result Area	Summary Main Activities	Timescale
5.1	Strengthened ICT Coordination and Management for all Database Sections	Upgrade ICT Unit based on the functions defined under Ministry's organization structure approved 2006	Short to medium Term
		Define organisational structures for database Sections	
		Identify staffing and skills requirement	
		Identify and provide relevant training to staff	
		Train database staff at each level	
5.2	Management Sensitisation and Training on ICT	Undertake ICT training needs assessment for Management	Short to medium Term
		Prepare ICT Training and sensitisation programme	
		Institute ICT training and sensitisation programme	
5.3	End User commitment and capability on ICT	Undertake ICT training needs assessment	Short to medium Term
		Prepare ICT Training Programme	
		Institute ICT training programme	
		Periodic Assessment	
5.4	Change management into ICT usage for all stakeholders in the Ministry, BWO's, LGA's, and other WSDP implementing entities	Formulate unequivocal messages of support for the systems from the top	Short to medium Term
		Plan sensitization sessions for stakeholders at all levels	
		Involve stakeholders in decision making in their specific areas	
		Institute feedback mechanism for every introduced change and mechanism for improvement	
		Document entailing changes in key processes with staff sensitization plans	
		Appointment of change agents	
		Establishment of monitoring, evaluation and reporting mechanism	
		Establishment of appropriate management, responsibility and accountability structures.	

3.6. Policies, Procedures and Processes Strategy

ICT policies and procedures are key component of the overall management of ICT. The procedures illustrate how systems are used and managed, the roles and responsibilities of users and technical staff, and the routines that need to be carried out to ensure integrity and security of data and information. The strategic actions for policies and procedures are:

- a) MOWI to ensure that business processes are reviewed periodically to ensure that they are in-line with the sector’s strategic goals and initiatives, taking into consideration the model business process (the current state) and an anticipated process (the future state) when embarking on improvement activities in the sector business. Processes and activities that do not add sufficient value to the strategic goal and initiative shall be eliminated.
- b) MOWI to ensure that each system introduced at the Ministry shall have comprehensive technical documentation to ensure that maintenance and support can be passed over to internal staff;
- c) MOWI to ensure that each system have comprehensive user procedures, which will be used as training materials for users as well as first point of reference in operations;
- d) MOWI to ensure that each system developed have Service Level Agreement (SLA) with developers or service provider for continuous improvement and support;
- e) MOWI to develop Service Level Agreement (SLA) between ICT unit and user departments/units on ICT service provided to the latter i.e. timely support and continuous improvement;
- f) MOWI will develop overall information security operational policies and business continuity plan. These will include: An overall ICT Policy, Computer Security Policy, Internet and Email usage policy, Business Continuity Policy; and Change Management Policy for ICT/MIS; and
- g) MOWI will from time to time monitor the adherence to these policies as well as their effectiveness. The policies will be reviewed from time to time as the need may arise.

Strategic Objective 6: Manage ICT Use and Security Issues in a Comprehensive and Coordinated Way

No	Key Result Area	Summary Main Activities	Timescale
6.1	Instituting operational Policies for information security and IT risks	Prepare information security policy	Short to medium Term
		Prepare business continuity plan	
		Approve Ministry’s information security policy and business continuity plan	
		Create awareness and train users	
		Institute the information security/ICT policy and business continuity plan for the Ministry	
		Undertake regular preventive maintenance of ICT equipments	
		Monitoring and evaluation of the policy implementation for continuous improvement	
		Ensure availability of technical documentations for all systems	
6.2	Institute technical and end user	Document End-User Documentation for all existing databases	Medium Term

No	Key Result Area	Summary Main Activities	Timescale
	documentation to ensure support and training of users	Ensure documentation of end-user procedures is part of any system development	Short Term
6.3	Institute SLAs for third parties and internal users	Develop template service level agreements for ICT Support	Short-Term
		Select service providers and enter into SLAs	Short-Term

CHAPTER 4: CONCEPTUAL FRAMEWORK FOR INFORMATION SYSTEMS

This chapter describes the conceptual framework of the Information Systems/Business applications that are of relevance for MOWI business processes. The objective is to describe at a high level the general needs and roles of sub-systems and linkages. From the strategic visioning presented earlier, and based on the information requirements, the high level systems requirements that are components of the overall Ministry's ICT applications and solutions are:

Core Business Applications:

- (i) Geographic Information System;
- (ii) Water Sector Monitoring and Evaluation System;
- (iii) Integrated Irrigation Database;
- (iv) Commercial Water Supply and Sewerage System;
- (v) Community Water Supply Infrastructure Monitoring System;
- (vi) Water Resource Management and Monitoring System; and
- (vii) National Water Quality Management and Monitoring System.

Support business Applications

- (i) Workflow and Document Management System;
- (ii) Procurement and Contract Management System;
- (iii) Assets Management Information System;
- (iv) Human Capital Management Information System;
- (v) Project and Financial Management Information System;
- (vi) IT Help desk support system;
- (vii) System for Public Information Dissemination (One stop information centre);
- (viii) General and specialized Applications; and
- (ix) Operating systems

Business applications for affiliated agencies and entities

Also identified are business applications for affiliated agencies and entities to be supported:

- a) Maintenance Management Systems
- b) Human Capital Information Database
- c) Financial Management System
- d) Integrated Customer Database

Table 4.1 depicts the graphical framework of the core business applications that are components of the overall Ministry's ICT solutions. The diagram shows where the applications ownership will reside and where they will be implemented to capture data and provide information.

Figure 4.1: Graphical Framework for Core Business Applications



4.1. Core Business Applications

4.1.1. Geographic Information Systems

A Geographic Information System (GIS) is an automated information system that is able to compile, store, retrieve, analyse, and display mapped data. As such, they are able to perform a range of functions, including data capture, data cleaning, data integration, data storage, data search and retrieval, spatial analysis, statistical analysis and data display.

Together with modelling, GIS are valuable tools in Integrated Water Resource Management (IWRM) because effective water resource management requires an in-depth understanding of location, timing and amount of Surface and underground water used. Geographic Information System (GIS) technology can provide an ideal platform in which to analyse and display this type of information. The GIS technology will also enable

- Capturing water points and infrastructure related to water development and supply services country-wide in order to get spatial related picture in the overall water development services;
- Relate point measurements to administrative and hydrologic units,
- Generate customised maps for water development services, query the database and use the data in an effective manner; and
- Assist in providing comprehensive, interactive, easily accessed and user-friendly data bases covering all important aspects of the water development services; and provide such data to all legitimate users involved.

The GIS database shall include among others thematic data layers drawn from various data sources, the core data layers including surface and underground water bodies; multiple watershed models; aquatic species; rivers; political boundaries; population density; soils; satellite imagery; water points; and many other physiographic and climatological data types.

4.1.2. Sector Monitoring and Evaluation System

Monitoring and evaluation is central to successful implementation of the Water sector development strategy. It provides the sector or Ministry with information upon which decisions will be made and controls instituted. This system will assist managers and decision makers about current and future programme directions; and contribute to policy formulation, sector dialogue, standard setting and quality control. Each implementing entity or sub sectors will be responsible for the part of the Monitoring and Evaluation system that is specific to its operations. The Ministry or sector requires monitoring and evaluation systems for the following purposes:

- a) To monitor the implementation of the National Water Sector Development Strategy as well as WSDP against indicators as per log-frame;
- b) To monitor the implementation of programmes and projects, provide link to all districts, track coverage, sub-project progress, and lessons learnt;
- c) To gather statistics that will be compared to indicators of how the sector contributes to National Strategy for Growth and Poverty Reduction (NSGPR) and MKUKUTA;
- d) To track performance in technical, commercial, human resources and financial information indicators for the sector;

- e) To monitor sewerage and sanitation services demand and supply;
- f) To track and report lifetime and maintenance of water schemes;
- g) To track and report on water scheme implementation and sustainability; and
- h) To track sector performance as a whole.

Currently Monitoring and Evaluation is partially achieved by using manual checklists that are periodically used to survey progress of implementing the national water development services & WSDP. There is a need to formalise the checklists used by the various entities under the sector so that all M&E data gathered are harmonised and shared among implementing entities in order to enhance the responsiveness of the people who provide data from various sources.

4.1.3. Integrated Irrigation Database

Integrated Irrigation database will be implemented for the Irrigation and Technical Services sector. The Irrigation database is needed for the following objectives:

- a) To monitor the implementation of the National Irrigation Programme;
- b) To monitor the implementation of irrigation projects at district level, track sub-project progress, and lessons learnt;
- c) To gather statistics that are compared to indicators of how the sector contributes to National Strategy for Growth and Poverty Reduction (NSGPR) and MKUKUTA;
- d) Using GIS to map irrigation infrastructure, potential irrigable land, demand in each district; traditional irrigation and irrigation projects in the country at large;
- e) Inform private sector on the opportunities available in terms of studies, design, construction, supervision, agronomic inputs, irrigation equipment, and farm operations facilities including big and small tractors;
- f) To capture spatial data for a GIS system.

Currently a database is under development using MS Access running on a Xeon server located at the Division of Irrigation and Technical Services. It is expected that the database will be redesigned to align with the existing information requirements as well as the National Irrigation Policy and adhere to changing technologies.

4.1.4. Commercial Water Supply and Sewerage System

The Commercial Water Supply and Sewerage System will be developed to assist the ministry to monitor the performance of the service providers in water supply, to enable the ministry to respond accordingly to policy issues emanating

The objectives of the system include:

- a) To track sector development progress for water supply and sanitation;
- b) To monitor the performance of service providers in terms of coverage, network connection, revenue collections, water sector infrastructures development, wastages and non-revenue water;
- c) To assist the Commercial Water Supply and Sewerage Division to monitor the performance of service providers in terms of revenue collections, water sector infrastructures development, wastages, non-revenue water; HR management, records management, financial and asset management. The monitoring is against the indicators

identified in the Memorandum of Understanding (MoU) and NWSDS and targets set in the MKUKUTA and MDGs.

Currently, Majis system is implemented through EWURA to provide the information for regulatory purposes. The system is operational and it comprises data sheets including technical, commercial, human resources and financial information. The data sheets are filled in by UWSSA's on a monthly basis as well as at the end of fiscal year. The system was installed to all 20 WSSA's including DAWASCO and presently it is updated to also cover more than 100 DUWSAs, small towns and National Projects. The system is delivering adequate information but may require minor improvements based on the wider applications and requirements from diversity of users within the sector as well as to ensure that it provides all information tailored to coordination roles of the Ministry through Division of Commercial Water Supply Division.

4.1.5. Community Water Supply Infrastructure Monitoring System

The Community Water Supply Infrastructure Management System will essentially support district/local councils in the management of water supply and sanitation. Ideally it should be a Web based system to link all districts, track coverage (population served, water fund, water committees, COWSOs (water users association, companies, trustees etc.), sub-project progress, and lessons learnt to be updated by district water engineers in the districts. The specific objectives of the system include the following:

- a) To locate water points services in each district;
- b) To track water supply and sanitation schemes;
- c) To track progress, coverage and quality of projects and sub-projects/ Schemes and challenges;
- d) To track water quality information for end-users;
- e) To link all districts and consolidate data by region and nationally to be updated by district water engineers in the 132 districts; and
- f) Monitoring and evaluation of sub sector performance.

Currently, there are two imperfect and incomplete databases in Rural Water Supply Sub sector:

- a) The Rural Water Supply Database, developed by GTZ in 2004. The software is not used for the purposes intended due to some technical and functional problems. Currently there is an ongoing process of improving the systems so that it start working for the intended purposes under this sub sector; and
- b) The Maji MIS developed for the RSWWP for project monitoring. The target users are technical staff and District Water Engineers. Currently it is yet to be rolled-out to any of the 132 districts. There are several bugs and the software is subject to re-development due to the change of water policy (particularly the Query menu is subjected to change).

In March 2009, the Water Sector Working Group agreed to replace these two systems with a new National Rural Water Supply Infrastructure Monitoring System (NRWSIMS) based on GIS technology or water point mapping. This implies that the intended NRWSIMS must incorporate spatial databases that provide all location and attribute information required by all users.

4.1.6. Water Resources Management and Monitoring System

Management of water resources, both surface and groundwater, quantitatively and qualitatively is a fundamental element of water resources planning process. However the

assessment is currently inadequate and is weakened by a lack of unfed information based at both basin and National levels. The system known as HYDATA, ArcGIS, ArcView and ILWISS were implemented by the Division of Water Resources Management to capture, process, demarcate, digitise and map hydrological, hydro-geological, hydro- meteorological data. Some of the systems have been implemented at MoWI headquarters and in all Basin Water Offices except Lake Victoria Basin. Some of the issues with this system include lack of skills and competence among users; and lack of detailed documentation of user procedures. Water Resource Management entails Surface water resource, groundwater resources in quantity and quality.

WRM Information system integrated with GIS/GPS assist in the monitoring of fundamental hydrological, hydro-geological, and hydro-meteorological, water quality and environmental processes in the basin. The system will be integrated with GIS technology to consolidate countrywide integrated spatial and non-spatial data. The objectives of the system include:

- a) Water resource monitoring and resource assessment, including hydrological, hydro-geological information, hydrometric, water use and water quality information;
- b) Water quality management and pollution monitoring;
- c) Surface and ground water availability and exploitation;
- d) Mapping for water infrastructures distribution such as dams, weirs/water intakes, canal for example in irrigated areas, etc;
- e) Water resources potentials, demand and supply;
- f) River Basin Modelling and Decision Support Systems;
- g) Tracking implementation against indicators as per the logical framework of the NWSDS.
- h) Integrating information on surface water bodies, watersheds, rivers and related data in Time series (water levels, discharge quantity, rainfall, evaporation etc.);
- i) Establishing scientific management of water resources;
- j) Mapping of ground and surface water sources, availability in quantity and quality and exploitation basin wide;
- k) Integrating quantity and quality of water resources as a key to IWRM.

The system will also provide the following additional information: physical location of water resources; water resources consumption and production patterns; project and water supply performance; research reports; regulations and standards; financial and administrative information; and list of professionals and firms. Ideally, this system will be implemented at the MoWI head quarter and at the nine Basin Water Offices.

4.1.7. Water Quality Management and Monitoring System

Water Quality Management and Monitoring Information System will be implemented at the Water Laboratory Services Directorate to register water samples, production of water quality reports, conveying and receiving information from customers, and billing to customers. The system will be formed by two components using GIS technology:

- a) Water Quality Database; and
- b) Customer Database and Billing System.

The objectives of the system are:

- a) To speed up provision of water quality data to the public and other program/project related to water quality;
- b) To capture and analyse data to help solve problems and optimise operations of the distribution system and water treatment works;
- c) To register water samples and produce water quality reports;
- d) To map ground and surface water quality;
- e) To capture analysis of water treatment chemicals;
- f) To capture results of soil analysis for irrigation and agriculture;
- g) To monitor physical, chemical and bacteriological water quality in compliance to Environmental Management Act and water resources management Act in collaboration with the Water Resources Management and NEMC; and
- h) To facilitate computerised billing systems to customers.

Currently data is maintained manually. This system will be designed and implemented at the Water Laboratory Services Division and at all Zonal Water Quality Laboratories.

4.2. Support Business Applications

4.2.1. Workflow and Document Management System

The Ministry is in the process to put in place a Ministry-wide document management and records tracking system. This system intended to supplement the existing manual based document and records management. The intended DMS is expected to support the following:

- a) To capture, store and enable sharing of documents in electronic form;
- b) To enable electronic creation and assignment of records and documents;
- c) To enable electronic records filing and retrieval systems;
- d) To allow prioritization and scheduling of incoming and outgoing documents;
- e) To provide an easy way of tracking document processes;
- f) To allow documents to be uploaded to a central server and to be easily searched by others using reference numbers, keywords, contents, date, classification, barcodes, etc;
- g) To allow the attaching and linking of related documents;
- h) To enable capturing of employees records and images/pictures as well as electronic preparation of Identity Cards; and
- i) To enable e-procurement processes in the Ministry in collaboration with other implementing agencies or partners under water sector and irrigation sector.

Currently, the system has been designed subject to start implementation after procuring the required equipments and software.

4.2.2. Procurement and Contract Management System

The objective of the Procurement and Contract Management System will be:

- a) To monitor the implementation of annual procurement plans;

- b) To track down contract performance;
- c) To maintain procurement documentation; and
- d) To maintain a database of service providers.

Currently the Public Procurement Regulatory Authority has implemented the Procurement Management Information System (PMIS) to support procurement monitoring in public entities. It collects stores and enables sharing of procurement information. It is hosted internally and rolled out on-line to some procuring entities where data entry is done. Since each procuring entities is obliged by law to submit to PPRA some specific document, the Procurement Management unit of the Ministry should register with PPRA to use PMIS for reporting of procurement compliance. This will reduce a requirement of submitting documents on hardcopy and eliminate a risk of loss of such documents. The system to be designed at the Ministry will complement PMIS to provide the monitoring function. The system will be linked to the Workflow and Document Management System, which will handle documentation.

4.2.3. Assets Management Information System

Asset Management Software shall be used to control the following:

- a) Recording and Storage of information on fixed and movable assets;
- b) Asset tracking;
- c) Assets coding and identification;
- d) Depreciation/financing on assets;
- e) Asset maintenance management;
- f) Management of spare parts and consumables; and
- g) Purchasing and procurement of assets.

Currently, the Ministry does not have systematic and proper system for assets management. Most of the assets are not properly recorded and tracking system is not available. The storage means is manual and sometimes records are lost. Based on the existing challenges on assets management and controls the Ministry will deploy Assets Management Software for fixed and non fixed assets as possible.

4.2.4. Administrative and Management Control Systems

These systems will assist management in control and decision making in relation to other non-technical aspects. The assessment of systems that have been implemented or are in the process of being implemented at the Ministry includes:

- a) Human Capital Information Database: The Department of Administration and Human Resources Management is implementing the system under Public Service Reform Programme coordinated by Presidents Office, Public Service Management. The plan started to enhance and roll-out of this database as part of the implementation of Public Service Reform Programme Phase II;
- b) The Integrated Financial Management System called EPICOR: this is implemented by the Accounts and Finance Unit. The system is currently used by the Accounting Unit only and not accessed by other Departments and Units. The system is managed by the Ministry of Finance and Planning; and

- c) The Strategic Budget Allocation System (SBAS3): This is implemented by the Directorate of Policy and Planning for planning and budgeting in line with MTEF.

The Ministry will need to introduce the following sub-systems:

- a) IT Help desk support system;
- b) Water Utilisation and Allocation: water right register, discharge permit registers, registers of water user associations, etc.

The Ministry will also ensure the replication of most of the administrative and management control systems to Water Basin Offices and other agencies under the Ministry. The replication will avoid duplication of efforts in designing new systems that are already existing or planned by the Ministry HQ for deployment. The key issue is to ensure that user requirements are determined at each level.

4.2.5. Public Information Dissemination System

Planned systems for disseminating information to stakeholders comprise:

- a) MoWI official website;
- b) MoWI Intranet;
- c) Use of web-driven online databases for the public;
- d) MoWI email system;
- e) Link to other e-government portals; and
- f) Internet services.

The objectives of the systems include:

- a) Publication of data;
- b) Posting all the forms for services provided by the Ministry;
- c) Posting in intranet for all information that is for internal use by the Ministry units and departments to enhance service delivery;
- d) To ease communications within the Ministry and with stakeholders outside the Ministry; and
- e) To raise awareness on Ministry's strategies and activities among stakeholders.

4.2.6. General and Specialized Applications

A set of applications will enhance productivity, improve quality of service delivery, facilitate sharing the information Ministry-wide, and with other government agencies include:

- a) Computer aided design (Water CAD, AutoCAD, etc);
- b) Computer aided maintenance;
- c) Office productivity software (word-processing, spreadsheet, presentation, publishing, project management, desktop publishing, etc);
- d) Statistical Analysis software and Data Automation Kit; and
- e) Other specialised technical software applications (e.g. Dbase, ARCVIEW, and ARCINFO).

4.2.7. Operating Systems

Microsoft operating systems and office tools are taken as de-facto standard for the Ministry. However, the Ministry is now deploying Linux for Servers and may transform into open source applications but with consideration of the existing and planned Government Circulars, directives and Policies that are given by mandated Government Ministries and agencies such as Presidents Office – Public Service Management (PO-PSM); Ministry of Science, Technology and Communications and/or Tanzania Communications Regulatory Authority (TCRA).

4.3. Systems for Affiliated Agencies and Entities

The Ministry will provide technical support to:

- a) Dam and Drilling Construction Agency;
- b) Water Development and Management Institute;
- c) UWSSAs; and
- d) Maji Central Stores.

In addition, the Ministry, in collaboration with the Prime Minister's Office – Regional Administration and Local Governments is charged with the responsibility to strengthen district water engineers' offices and regional secretariats. The support in terms of ICT shall include the following:

4.3.1. Maintenance Management Systems

One of the key issues facing service delivery agencies is lack of routine and preventive maintenance. Lack of information on maintenance requirements is one of the reasons. Switching from standard corrective maintenance (repairs) to a more advanced predictive maintenance approach will result in more cost-effective investment expenditure. While UWSSAs, for example in Tanga, Moshi and Arusha, had a computerised maintenance management system, they have failed to continue operating it owing to lack of support from the suppliers of the system. The maintenance management system is useful for UWSSAs, COWSOs, national projects, and water and irrigation schemes.

The Ministry can assist the agencies by identifying and procuring suitable software with enough licenses for all agencies.

4.3.2. Human Capital Information Database

The Ministry can assist the agencies by commissioning a study to identify and procure suitable software with enough licenses for its agencies.

4.3.3. Financial Management System

Some UWSSAs may not be able to provide proper financial information, and therefore impair their transparency. Financial management software packages vary according to the nature of an organisation and its size. It is evident that UWSSAs have strong similarity in nature, though they may vary in size. The Ministry can assist the UWSSAs by commissioning a study to identify a suitable financial management software package and procure enough licenses for all UWSSAs because this kind of procurement may be cost effective in terms of investments and sustainable maintenance of the system. In addition, the Ministry can source funds to properly implement the software.

4.3.4. Integrated Customer Database

Some Urban Water Supply and Sewage Authorities have implemented sophisticated integrated customer databases. These systems integrate customer information, billing, systems management and spatial Data for customers and water distribution, wastage, misuse, leakage as well as records of maintenance. The use of ICT has tremendously improved delivery of customer services, as it can evidently be witnessed at UWSSAs in Arusha, Moshi, Tanga and Dodoma. The Ministry, as part of its mandate to provide capacity building of service delivery entities, can coordinate a project to implement similar systems in other UWSSAs. Strategic actions may include:

- a) Sourcing the financing for acquisition and implementation of the same system, which has been proven in the field, for all UWSSAs that have not computerised; and
- b) Coordinate the implementation of the system.

The Ministry may build capacity by facilitating exchange of staff between UWSSAs to gain experience in running the systems (knowledge sharing).

4.4. MIS Framework for the Water and Irrigation Sectors

The following section therefore provides a guide for reviewing and ensuring that components that need to be in place for sector MIS environment are understood and put in place.

4.4.1. Strategic Initiatives

The Sector's strategic initiative contains a clear description of what MIS will contribute to achieve the sector's goals and direction. It serves as the driving forces behind the Framework. In a nutshell the sectors strategic initiative on MIS should echo the following:

- A clear purpose or mission statement;
- Success criteria;
- Strategic direction of the Sector;
- A competitive strategy to ensure survivability; and
- A measurable outcomes and performance measures,

4.4.2. Business Processes

The Sector's business processes constitute the organizational activities, procedures and priorities that accomplish the mission.

The business processes must be reviewed periodically to ensure that they are in-line with the sector's strategic goal and initiative. Where position the sector should undergo a re-engineering effort, taking into consideration, the Model business process (the current state) and an Anticipated process (the future state) when embarking on improvement activities in the sector business. It is therefore recommended that processes and activities that do not add sufficient value to the strategic goal and initiative be eliminated. In a nutshell, business processes should be modified if change can reasonably increase the value to the sector.

4.4.3. Information Flow

This architecture ensure that information exchange at the sector is optimised. It presents an opportunity to develop new/future methods for information flow. Effective Information flow requires consideration in the following areas:

- Database Design and function for the sector;
- Data standards;
- Data formats;
- Data dictionary; and
- Repositories for reusable information objects.

4.4.4. Systems and Services

Current systems and application/web services that the sector currently uses to deliver information technology capabilities to all of its functional domains must be documented. It is important that their functions are clearly documented so that the systems are correctly adjusted when the business drivers, business processes and information flow, changes to ensure that all technologies are duly aligned to the business they support.

4.4.5. Customization

It is not uncommon that a line of business chooses to customise applications for its use. In such occurrences the Framework recommends that the following hold true:

- Ensure that the system complies with all applicable standards defined to ensure Scalability, Integration, Interoperability and Maintainability
- Ensure that Cost (Product, Training, Maintenance, Ownership, Sustainability) is not prohibitive
- It complies with internal MoWI, National and International Standards

4.4.6. Technology Infrastructure

The Sector's technology infrastructure should be organised and documented to capture the Sector's current and future view of the voice, data, and video networking that the sector uses to host systems, applications, websites and databases. The Sector's LANs, WANs and all other forms of network within the Sector, including Wireless Networks and Intranets must all be organised and documented at this level so that efficient design can be implemented through the future architecture that reduces duplications, increases cost and performance efficiency and promotes availability and survivability.

It is also essential that Sector's IT capabilities/systems address disaster recovery. The goal is to ensure available if the primary resources became unavailable.

4.4.7. Line of Business

A line of business (LOB) is a distinct area of activity that provides services or internal administrative functions to the Sector. Each line of business can have an architecture that includes all five hierarchical levels of the framework. It must however be understood that a LOB may be a beneficiary of another LOB hence dependencies may influence the way decisions on MIS and IT systems are made in order to avoid duplications.

Water Resource Management, Rural Water Supply, Urban Water Supply and Small Town Water and Sanitation, DAWASA etc are all examples of LOBs. Internal departments within an entity can also be classified as LOBs depending on their structures. However, this Framework should achieve key benefits which include data integrity, systems availability, systems integration, systems interoperability and maintainability.

4.4.8. Cross Cutting Activities

Cross Cutting activities that serve several lines of business within the Sector shall employ Cross Cutting activities to avoid inefficiencies of duplicative support. Some of the advantages of cross cutting are:

1. Provision of common databases, application suites and network infrastructures;
 - a. Promote the hosting of the database at multiple locations.
 - b. Consider Web and Distributed client-server computing.
2. Reduces application hosting cost;
3. Increases information sharing;
4. Enables enterprise-wide infrastructure solutions; and
5. Emails that server an entire enterprise, financial systems that serves several lines of business and telephone services are also examples of cross cutting or horizontal components. Vertical components serve a single LOB, e.g.: applications, databases and website etc.

4.4.9. Planning threads within the Framework

Common activities that pervade all levels of the framework are called "threads". The Sector shall therefore employ such activities, with key consideration to unique requirements such as autonomy and data ownership of each LOB - They include the following:

1. IT Security

- a. In order to be effective security must work across all levels of the framework and within all components
- b. Focal points include: Information, Personnel, Operations and Facilities

2. IT Standards

- a. Technology related standards at all levels of the framework: Draw on acceptable International, National and Industry standards
- b. Promote the use of non-proprietary solutions in the framework components: This promotes and enhances integration among components, upgrades and replacement of solutions

3. IT Workforces

The way human capital will be deployed in enabling technology capabilities which underline business processes and information flow shall be documented. This will include identifying staffing skill and training requirements at all levels of framework to support future architecture.

CHAPTER 5: CRITICAL SUCCESS FACTORS AND RISKS

5.1. Critical Success Factors and Risks

The successful deployment of ICT in the Ministry requires a high level of coordination, a constant demand of tangible results, proactive leadership and strong management. There are always a number of critical success factors and risks associated with ICT implementation. Some of the key ones are highlighted.

5.2. Critical Success Factors

Critical success factors for the successful implementation of the strategy include the following, among others:

Table 5.2 Analysis of Critical Success Factors

Critical Success Factors	Requirements
Management support and management commitment	<ul style="list-style-type: none"> • Strategy acceptance in the Ministry • Continuing engagement of management at all levels of implementation
ICT Leadership	<ul style="list-style-type: none"> • Consolidate IT structures to ensure responsiveness and accountability • Clear and adequate roles and responsibilities for ICT Unit/people and ICT related coordinating committees.
Human Resource capacity	<ul style="list-style-type: none"> • Continuous capacity development • Continuous public involvement
Effective communication among IT and business and down to lower levels	Create an environment that enhances interaction between the ICT unit and the business units within the ministry
Consolidated IT structures to ensure responsiveness and accountability	ICT unit with sufficient powers to coordinate database sections within the ministry to achieve ICT objectives
Institutional and Legal Framework	Clearly defined institutional framework and supportive legislation and enforcement mechanisms
Financial Resources	<ul style="list-style-type: none"> • Recognition of ICT as a priority area in the delivery of Ministry services • Cost effectiveness in the allocation and use of available financial resources and avoid duplication of efforts or redundancies
Commitment by all actors	<ul style="list-style-type: none"> • Continuous coordination and buy-in by all actors or stakeholders • Active coordination among all stakeholders to delivery and enforce the improvement of services delivery through ICT
Sustainable Infrastructure	<ul style="list-style-type: none"> • Network and information security • Infrastructure to sustain the use of IT systems • Reliable infrastructure to support continuous availability of

	data from fields
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5.3. Risk Management

Risk is about uncertainties and constraints. There are a number of risks and dependencies that may affect the successful implementation of this strategy. In this manner, risk management shall be a major concern and will involve activities undertaken with the intent of providing a plan that minimises the adverse impacts of risk on project resources. Possible risks and mitigation measures have been identified in the table 5.3 below.

Table 5.3 Risk Matrix

Risk	Impact	Mitigation
Donor dependence	High	<ul style="list-style-type: none"> Local funding Public private partnerships
Resource un-availability	Medium	<ul style="list-style-type: none"> Government funding for IT projects Effective Management of development partner's funds
Management Commitment and support	High	<ul style="list-style-type: none"> Sustain management commitment Solve issues related to non-ICT solutions Delivery of electronic services for decision making
Resistance to change	High	<ul style="list-style-type: none"> Raise awareness and continuous ICT training Manage expectations Involve all users Clarity of scope, roles and responsibilities Expose technology and do not underestimate the resistance to change within the Ministry
Technological failure	Medium	<ul style="list-style-type: none"> Business continuity Disaster recovery plan Do not over trust in technology solutions
Technological Obsolescence	Low	<ul style="list-style-type: none"> Planning of technological refresh Build internal capacity
Privacy and security	High	<ul style="list-style-type: none"> Information security policy Security measures Effective rules and regulations
Dependence on a single technology supplier	Medium	<ul style="list-style-type: none"> Use standard-based technology Effective contract management
Poor data quality	High	Computers will not clean up a mess that exists already. If the existing procedures are not well defined, if there is incomplete data and if there are conflicting objectives for the systems, ICT is not a substitute. Therefore the

		<p>following are needed:</p> <ul style="list-style-type: none"> • Well defined procedures • Non conflicting of objectives for the system
Stakeholders with different objectives	Medium	Support and commitment of key stakeholders is a critical success factor. There is a need to ensure that stakeholders participate in the process and their interests are considered, through frequent communication to address stakeholders' uncertainty.
IT structure that is not strong enough (e.g. unit instead of Department/division)	Medium	Create a decentralised ICT Structure which is closely coordinated by the Ministry's ICT Department

CHAPTER 6: IMPLEMENTATION PLAN AND MONITORING FRAMEWORK

This section describes the plan for implementing the ICT strategy for MoWI and the means of monitoring the implementation progress. The detailed implementation plan and indicators for monitoring are presented in Appendix A.

1.1 Implementation Organisation

A Project Implementation Team (PIT) comprising ICT and key users will be formed for each project to be implemented to coordinate the implementation. Also there will be a Steering Committee to provide directives, monitor implementation progress and effect the required initiatives at policy and administrative levels where as the PIT will be responsible for the day to day implementation of the new system and shall work closely with the developer/supplier of the new system, provide guidance as regards to site preparation and survey, prepare for the implementation of the applications on the centralized servers and client sites.

1.2 Implementation Tasks

The plan covers activities to be implemented, responsibilities and time frames. However, the plan does not cover the specific dates when the activity implementation will occur; it contains indicative half yearly timing. The implementing unit or entity will need to estimate the duration for each activity to be implemented in order to determine the start and finish dates for each activity in each financial year based on government Medium Term Expenditure Framework (MTEF).

1.3 Monitoring and Evaluation

The implementation plan contains detailed activities for monitoring progress of implementation and indicators for evaluation of the implemented projects. The plan covers four types of projects, these are: infrastructure projects, systems/applications projects, operational policies documentation projects and capacity building projects. Table 6.3 shows some concerns at each level which can be used to identify the relevant indicators of performance.

Table 6.3: Matrix for Concerns for ICT Unit and Systems Owners

Area of Implementation	ICT Unit	Systems' Owners
Objective 1: Document and implement database management principles	<ul style="list-style-type: none"> • Are all the principles documented? • Are they based on the current based practice in database management? • Are they practical? • Is all staff concerned been trained in the principles? • Have they been implemented successfully? • Have they resolved issues that existed? 	<ul style="list-style-type: none"> • Are there improvements in the way databases are designed and managed? • Has this made our work easier?
Objective 2: Improve interaction with stakeholders	<ul style="list-style-type: none"> • Are the systems providing relevant information to users? • Is the information regularly updated? 	<ul style="list-style-type: none"> • Has the implementation of the systems improved our work? • Has it improved service

Area of Implementation	ICT Unit	Systems' Owners
Objective 3: Implement the Conceptual Framework for specific solutions and Sector MIS to support business processes	<ul style="list-style-type: none"> • Have user and business requirements been thoroughly documented? • Have the systems been developed and tested to the user satisfaction? • Is the system/application technical documentation provided? • Are the user procedures documented? • Has data migration been completed successfully: • Have the systems users been trained? • Have the systems support personnel been trained? • Is the system in use? 	delivery to citizens? Does the system meet our requirements? Has the system improved efficiency and effectiveness? Are we getting value for money?
Objective 4: Improve the technical infrastructure to facilitate communication and automation of key business functions	<ul style="list-style-type: none"> • Are systems installed? • Is the mapping and documentation completed? • Are the maintenance plans in place? • Is the inventory of infrastructure maintained? • Are users trained? • Is the entire target users reached? 	<ul style="list-style-type: none"> • Have the infrastructure solved the problems that existed? • Has the project improved our efficiency and effectiveness? • Are we getting value for money?
Objective 5: Build implementation capacities and change management	<ul style="list-style-type: none"> • Are the support staff provided with sufficient skills and training? • Has it improved their performance? • Are users trained in ICT in general and in their specific applications in particular? 	<ul style="list-style-type: none"> • Has capacity building enhanced performance of staff?
Objective 6: Manage-ICT use and security issues in a comprehensive and coordinated way	<ul style="list-style-type: none"> • Are all policies documented? • Are they exhaustive? • Are they practical? • Have they been approved? • Is all staff concerned been trained in the policies? • Do users abide by the policies 	<ul style="list-style-type: none"> • Are policies helping in improving the situation? • Are we abiding by the policies? • Do we get enough support in implementing the policies?

Based on Table 6.3 above, the matrix of concerns, the indicators of performance in the implementation plan (Appendix A) are drawn for the M&E.

APPENDIX A: STRATEGY IMPLEMENTATION PLAN AND MONITORING FRAMEWORK

Implementation Plan

S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
1	DOCUMENT AND IMPLEMENT DATABASE MANAGEMENT PRINCIPLES							
1.1	Information Sharing, Efficiency and Effectiveness of IT Processes							<ul style="list-style-type: none"> Data sharing among the departments/units within the Ministry Sharing of data between MOWI and other implementing entities under water development services and irrigation Systems support and development guidelines
1.1.1	Develop guidelines for business process reengineering	MOWI						
1.1.2	Document systems development guidelines	MOWI-ICT UNIT; PO-PSM						
1.1.3	Identify systems that can be shared by different entities in the Ministry	MOWI; IE						
1.1.4	Assess type of system support to be provided by MOWI ICT Unit and that may be outsourced	MOWI - ICT Unit						
1.2	Database ownerships							Data entry and information processing is done by the appropriate implementing entity at appropriate level (data sources)
1.2.1	Identify key users of each existing database	MOWI; IE						
1.2.3	Identify information clients	MOWI; IE						
1.2.4	Design the approach for linking the databases or electronic publishing of outputs from databases	MOWI ICT Unit; IE; PO-PSM						
1.3	Standardisation Of Definition Of Datasets For Coordinated Monitoring And Evaluation Purposes							Harmonised datasets across the Ministry/Sector
1.3.1	Identify categories of data	MOWI; IE						
1.3.2	Agree on dataset definitions	MOWI; IE; MDA's						
1.3.4	Develop sector wide data Models	MOWI; IE						
2	IMPROVE INTERACTION WITH STAKEHOLDERS							
2.1	Complaints Management System							<ul style="list-style-type: none"> Ministry Website published with current issues and documentations Number of inquiries, requests and
2.1.1	Identify information demands for internal and external customers	MOWI; IE; PO-PSM						

S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
2.1.2	Identify forms for online uses	MOWI; IE; PO-PSM						complaints handled <ul style="list-style-type: none"> • Response time for inquiries, requests and complaints • Level of customer satisfaction and participation in the water/irrigation sector development services (to be measured by surveys)
2.1.3	Prepare requirement document (functional and non functional)	MOWI; PO-PSM						
2.1.4	Design and develop website portal	MOWI; PO-PSM						
2.1.5	Train technical staff and all users	MOWI; PO-PSM						
2.1.6	Support implementation activities	MOWI; PO-PSM						
2.1.7	Support post implementation activities	MOWI; PO-PSM						
3	IMPLEMENT THE CONCEPTUAL FRAMEWORK FOR SPECIFIC SOLUTIONS AND SECTOR MIS TO SUPPORT BUSINESS PROCESSES							
3.1	Geographic Information System to facilitate the Management of infrastructures under water and irrigation development services							<ul style="list-style-type: none"> • GIS requirement document for the Sector • Computerised Spatial data sets for the water sector and irrigation sectors • Equity allocation of water development projects based on water points and water supply services • Fully fledged GIS system for the water and irrigation sectors
3.1.1	Identify GIS core data sets needed for water development services	MOWI; MLHSD; IE; DP's						
3.1.2	Prepare GIS requirement document	MOWI; MLHSD; IE; DP's						
3.1.3	Initiate the design and develop GIS in modules to support water development services	MOWI; MLHSD; IE; DP's						
3.1.4	Procure and install GIS Equipment and software	MOWI; IE						
3.1.5	Train technical staff and all users	MOWI; IE						
3.1.6	Support implementation activities	MOWI; IE						
3.1.7	Support post implementation activities	MOWI; IE						
3.2	Integrated Water Resource Management Information System							<ul style="list-style-type: none"> • Requirement document • Operational IWRM System for MOWI • Integrated water resources management data • Electronic access of water resource related information
3,2,1	Identify data and information needs for IWRM	DWR; DWL; DITS; ICT Unit; BWO's, IE						
3.2.2	Prepare IWRMS requirement document (functional and non functional)	DWR; DWL; DITS; ICT Unit; BWO's, IE						

S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
3.2.3	Design and develop IWRM system based on the Ministry-wide core data model	DWR; DWL; DITS; ICT Unit; BWO's, IE						<ul style="list-style-type: none"> Access of IWRMS at BWO's electronically.
3.2.4	Train technical staff and all users	DWR; ICT Unit; BWO's; IE						
3.2.5	Support implementation activities	DWR; ICT Unit; BWO's; IE						
3.2.6	Support post implementation activities	DWR; ICT Unit; BWO's; IE						
3.3	Human Resources Management Information System							<ul style="list-style-type: none"> Requirement document Electronic access of HR information Electronic processing of HR reports (payroll; Personnel Bio-data; Seniority Lists; Training Programme; etc) Updated staff list for all implementing agencies
3.3.1	Identify the information needs for effective HRM	DAHR; PO-PSM; ICT Unit						
3.3.2	Design and develop the system	DAHR; PO-PSM; ICT Unit						
3.3.3	Train technical staff and all users	DAHR; PO-PSM; ICT Unit						
3.3.4	Support implementation activities	DAHR; PO-PSM; ICT Unit						
3.3.5	Support post implementation activities	DAHR; PO-PSM; ICT Unit						
3.3.6	Roll-out to other implementing entities under MOWI	DAHR; PO-PSM; ICT Unit						
3.4	Document Management System with Workflow							<ul style="list-style-type: none"> Proper indexed documents at the central file registry Requirements document E-Registry E-procurement WFMS
3.4.1	Replace the old files and make proper files arrangements at the Central File Registry, PMU, LU and all Departments/Units at the Ministry	DAHR; ICT Unit; PO-PSM						
3.4.2	Prepare requirement document for computerizing the system (functional and non functional)	DAHR; ICT Unit; PO-PSM						
3.4.3	Design and develop the system	DAHR; ICT Unit; PO-PSM						

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S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
3.4.4	Train technical staff and all users	DAHR; ICT Unit; PO-PSM						
3.4.5	Support implementation activities	DAHR; ICT Unit; PO-PSM						
3.4.6	Support post implementation	DAHR; ICT Unit; PO-PSM						
3.5	Assets Management System							<ul style="list-style-type: none"> Requirement document for Assets MGT System All assets coded and computerised Electronic processing of assets data and reports
3.5.1	Prepare requirements for the system	DAHR; PMU; ICT Unit; PPRA						
3.5.2	Design and develop the system	DAHR; PMU; ICT Unit; PPRA						
3.5.3	Train users	DAHR; PMU; ICT Unit						
3.5.4	Support implementation activities	DAHR; PMU; ICT Unit						
3.5.5	Support post implementation	DAHR; PMU; ICT Unit						
3.6	National Irrigation Database							<ul style="list-style-type: none"> Database Requirement documented; Database installed Availability of Irrigation data electronically
3.6.1	Identify data and information needs for National Irrigation services	DITS; ICT Unit; DWR						
3.6.2	Prepare requirement document (functional and non functional)	DITS; ICT Unit; DWR						
3.6.3	Design and develop system	DITS; ICT Unit						
3.6.4	Train technical staff and all users	DITS; ICT Unit						
3.6.5	Support implementation activities	DITS; ICT Unit						
3.6.6	Support post implementation activities	DITS; ICT Unit						
3.7	Commercial Water Supply and Sewerage Information System							<ul style="list-style-type: none"> Requirements document

S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
3.7.1	Identify data and information needed	DCWSS; ICT Unit; EWURA; DP's; IE; GTZ						<ul style="list-style-type: none"> • System design documentation • Installed and operational system • Availability of CWSS data electronically from IE under the UWSS Sub Sector
3.7.2	Prepare requirement document for the system (functional and non functional)	DCWSS; ICT Unit; EWURA; DP's; IE; GTZ						
3.7.3	Design and develop system	DCWSS; ICT Unit; EWURA; DP's; IE; GTZ						
3.7.4	Train users	DCWSS; ICT Unit; EWURA; DP's; IE						
3.7.5	Support implementation activities	DCWSS; ICT Unit; EWURA; DP's; IE; GTZ						
3.7.6	Support post implementation activities	DCWSS; ICT Unit; EWURA; GTZ; DP's; IE						
3.8	National Rural Water Supply and Infrastructure Monitoring System							<ul style="list-style-type: none"> • Requirement document • System design documentation • Water point mapping/GIS system operational • Availability of RWSMI data electronically • Electronic transfer of data from IE under Rural Water Supply and Sanitation such as LGA's
3.8.1	Identify data and information needs	DCWS; ICT Unit; DP's; LGA's, NGO's; IE						
3.8.2	Prepare requirement document (functional and non functional)	DCWS; ICT Unit; DP's; LGA's, NGO's; IE						
3.8.3	Design and develop system based on modules such as Water Point Mapping	DCWS; ICT Unit; DP's; LGA's, NGO's; IE						
3.8.4	Train users	DCWS; ICT Unit; DP's; LGA's, NGO's; IE						

Ministry of Water and Irrigation – ICT Strategy

S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
3.8.5	Support implementation activities	DCWS; ICT Unit; DP's; LGA's, NGO's; IE						
3.8.6	Support post implementation activities	DCWS; ICT Unit; DP's; LGA's, NGO's; IE						
3.9	National Water Quality And Monitoring System							<ul style="list-style-type: none"> • Requirements document • System design documentation • Processing and Availability of water quality data electronically
3.9.1	Prepare requirement document (functional and non functional)	DWL; ICT Unit; DWR; DP's; IE						
3.9.2	Design and develop system	DWL; ICT Unit; DP's; IE						
3.9.3	Train users	DWL; ICT Unit; DWR; DP's; IE						
3.9.4	Support implementation activities	DWL; ICT Unit; DWR; DP's; IE						
3.9.5	Support post implementation activities	DWL; ICT Unit; DWR; DP's; IE						
3.10	Planning, Budgeting And Procurement System for WSDP as a Module of Sector MIS							<ul style="list-style-type: none"> • Systems Requirement Document • Design documentation • Electronic processing and reporting on WSDP plans, budgets, procurement and disbursement data • Electronic production of Interim Financial Reports (IFR) through Computer System.
3.10.1	Requirements analysis	MOWI; DP's						
3.10.2	Design and develop the system	MOWI						
3.10.3	Train users	MOWI; IE; DP's						
3.10.4	Support implementation activities	MOWI; IE; DP's						
3.10.5	Support post implementation activities	MOWI; IE; DP's						
3.11	Sector MIS Short Term Solutions – Domain Focused							<ul style="list-style-type: none"> • Each system, manual or automated shall adhere to a common sector wide data collection model and structure • Data collected across the sector are logically related
3.11.1	Prepare and adopt the core data model – sector wide	MOWI; IE						
3.11.2	Determine attributes for the core data model and determine data structure for each attribute	MOWI; IE; DP's						

S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
3.11.3	Standardize M&E templates across the sector	MOWI; TBS; IE; DP's						<ul style="list-style-type: none"> • Short term solutions are easily inherited into the final MIS system to avoid throw away efforts • Streamlined M&E indicators to Government and DP's • Data elements and M&E reports
3.11.4	M&E data collection across the sector	MOWI; IE; NGO's						
3.12	Sector MIS Mid-Term Track – Domain Focused But With A Bit Sector Wide Capabilities							<ul style="list-style-type: none"> • Operational software; trained users; quick support access and response • Transition from paper works to electronic • Begins of management practices; easily exchange of documents • Policies governing emails, network resources and IT systems; Trained users • Standardised information and templates are accessed via common file server for domain use; elimination of duplications and ensure consistency across the sector
3.12.1	Acquire technical support tool to track issues to closure – Sectors help desk system	MOWI ICT Unit; IE						
3.12.2	Provide computers for all who do not have computers	MOWI; IE						
3.12.3	Ensure that software versions are the same across the sector	MOWI; IE						
3.12.4	Developing systems environment policies and guidelines (train and institutionalize standards across the sector)	MOWI ICT Unit; IE						
3.12.5	Configure Network environment and setup file server to shared corporate assets – read only	MOWI ICT Unit; IE						
3.13	Sector MIS Long-Term Track: - Sector Wide Focused							<ul style="list-style-type: none"> • Sector MIS Requirements Document • Sector MIS System design Document • Framework guidelines adhered to; compliance to core data models and other all applicable standards • LAN, emails, telephone and other communication facilities • IT security and business continuity plans; IT standards; IT workforce; and degree of autonomy
3.13.1	Requirement analysis to inspect existing systems; review their architecture; their models; drivers; interfaces; platforms; compliance, compatibility; maintainability and recommend enhancements.	MOWI; IE; DP's; PO-PSM; MSTC						
3.13.2	Perform Software Development Life Cycle activities concurrently	MOWI; IE						
3.13.3	Deploy sector MIS system	MOWI; DP's; IE; PO-PSM						
3.13.4	Ensure that crossing activities are in place across the sector	MOWI; IE; DP's						

S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
4	IMPROVE THE TECHNICAL INFRASTRUCTURE TO FACILITATE COMMUNICATION AND AUTOMATION OF KEY BUSINESS FUNCTIONS							
4.1	Standards for ICT Hardware and Software							<ul style="list-style-type: none"> • Hardware and software standard documented • Network standards documented • Standard applications • Enough licenses for IT hardware and software • Interoperability and sharing of IT resources
4.1.1	Obtain government recommended standards	MOWI; PO-PSM; MSTC; MFE; PPRA						
4.1.2	Choose standard for each application in the Ministry	MOWI						
4.1.3	Sensitise users on selected standards	MOWI						
4.1.4	Train users on selected standards	MOWI; IE						
4.2	Improvement of ICT Infrastructure							<ul style="list-style-type: none"> • Internal information and records sharing • Data transfer electronically among Ministry HQ, BWO's and LGA's • Automation of key business applications • Reliable intranet, extranet and internet services
4.2.1	Prepare and furnish server room	MOWI						
4.2.3	Prepare and furnish IT support rooms	MOWI; IE						
4.2.4	Procure and commission Central servers	MOWI						
4.2.5	Procure and commission Workstations	MOWI; IE						
4.2.6	Procure and commission printers	MOWI; IE						
4.2.7	Procure and commission power stabilizers	MOWI; IE						
4.2.8	Design, configure and install LAN/WAN/Intranets and Extranets	MOWI; IE						
5	BUILD IMPLEMENTATION CAPACITIES AND CHANGE MANAGEMENT							
5.1	Strengthened ICT Governance and Coordination for all IE							<ul style="list-style-type: none"> • The Unit upgraded to address the roles approved in the Ministry's structure and technology changes • Well coordinated ICT at each level • Staff training at each level on ICT
5.1.1	Upgrade ICT Unit based on the functions defined under Ministry's organization structure approved 2006	MOWI; PO-PSM						
5.1.2	Define organisational structures for database Sections for IE	MOWI; IE; PO-PSM						
5.1.3	Identify staffing and skills requirement	MOWI; IE; PO-PSM						
5.1.4	Identify and provide relevant training to staff	MOWI; IE						

S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
5.1.5	Train database staff at each level	MOWI; IE						
5.2	Management Sensitisation and Training on ICT							Enhanced management commitment and capability in ICT
5.2.1	Undertake ICT training needs assessment for Management	MOWI; IE						
5.2.2	Prepare ICT Training and sensitisation programme	MOWI; IE						
5.2.3	Institute ICT training and sensitisation programme	MOWI; IE						
5.3	End User Commitment And Capability on ICT							<ul style="list-style-type: none"> • Successful implementation and operations of all systems • users ownership of the systems and resource allocations • Citizen satisfaction with services delivered through ICT.
5.3.1	Undertake ICT training needs assessment	MOWI; IE						
5.3.2	Prepare ICT Training Programme	MOWI; IE						
5.3.3	Institute ICT training programme	MOWI; IE						
5.4	Change Management For All Stakeholders in the Ministry, BWO's, LGA's, and other WSDP Implementing Entities							<ul style="list-style-type: none"> • Successful ICT implementation and operations • Employee retention • Employee satisfaction • Customer satisfaction
5.4.1	Formulate unequivocal messages of support for the systems from the top	MOWI; IE						
5.4.2	Plan sensitization sessions for stakeholders at all levels	MOWI; IE						
5.4.3	Involve stakeholders in decision making in their specific areas	MOWI; IE						
5.4.4	Institute feedback mechanism for every introduced change	MOWI; IE						
5.4.5	Document entailing changes in key processes with staff sensitization plans	MOWI; IE						
5.4.6	Appointment of change agents	MOWI; IE						
5.4.7	Establishment of monitoring, evaluation and reporting mechanism	MOWI; IE						
5.4.8	Establishment of appropriate management, responsibility and accountability structures.	MOWI; IE						

S/O No.	Strategic objective, Key Result Area and Summary of Main Activities	Responsibility	2010/11	2011/12	2012/13	2013/14	2014/15	Indicators
6	MANAGE-ICT USE AND SECURITY ISSUES IN A COMPREHENSIVE AND COORDINATED WAY.							
6.1	Instituting Policies for Information Security and IT Risks							<ul style="list-style-type: none"> Information security policy documented Business continuity plan prepared Improved data backups, recovery procedure and server environment Migration of Ministry authentication infrastructure to central directory (security access)
6.1.1	Prepare information security policy	MOWI; PO-PSM						
6.1.2	Prepare business continuity plan	MOWI; PO-PSM						
6.1.3	Approve Ministry's information security policy and business continuity plan	MOWI						
6.1.4	Create awareness and train users	MOWI; IE						
6.1.5	Institute the information security/ICT policy and business continuity plan for the Ministry	MOWI; IE						
6.1.6	Undertake regular preventive maintenance of ICT equipments	MOWI; IE						
6.1.7	Monitoring and evaluation of the policy implementation for continuous improvement	MOWI; IE						
6.1.8	Ensure availability of technical documentations for all systems	MOWI; IE						

Key to Responsibilities

MOWI	Ministry of Water and Irrigation	ICT Unit	Information and Communication Technology Unit
PO-PSM	Presidents Office, Public Service Management	NGO's	Non Governmental Organizations
WBO's	Water Basin Offices	DWR	Division of Water Resources
IE	Implementing Entities	DWL	Division of Water Lab
DP's	Development Partners	DPP	Division of Planning and Policy
UWSSA's	Urban Water Supply and Sanitation Authorities	DAHR	Division of Administration and Human Resources
LGA's	Local Government Authorities	PMU	Procurement Management Unit
MSTC	Ministry of Science Technology and Communication	DCWS	Division of Community Water Supply
MLHSD	Ministry of Lands AND Human Settlement Development	DCWSS	Division of Commercial Water Supply and Sewerage
MFE	Ministry of Finance and Economy	EWURA	Energy Regulatory Authority
PPRA	Public Procurement Regulatory Authority	DITS	Division of Irrigation and Technical Services