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LIBERIA IMPROVED BUDGET AND ASSETS MANAGEMENT PROJECT ICT INFRASTRUCTURE ASSESSMENT REPORT FOR GOL

USAID GOVERNANCE AND ECONOMIC ASSISTANCE PROGRAM (GEMAP)

JULY 2010

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Ahmed El Sayed

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ACRONYMS

MoF	Ministry of Finance
MoE	Ministry of Education
MoPW	Ministry of Public Works
MoL	Ministry of Labor
MoC	Ministry of Commerce
MoT	Ministry of Transport
MoPT	Ministry of Post & Telecommunications
MoND	Ministry of National Defense
MoJ	Ministry of Justice
CBL	Central Bank of Liberia
GSA	General Services Agency
CSA	Civil Service Agency
GAC	General Auditing Commission
LTA	Liberia Telecommunications Authority
MoIA	Ministry of Internal Affairs
MoH	Ministry of Health
MPEA	Ministry of Planning & Economic Affairs
MoA	Ministry of Agriculture
MLME	Ministry of Lands, Mines & Energy
MICT	Ministry of Information, Culture & Tourism
MoS	Ministry of State for Presidential Affairs
MoFA	Ministry of Foreign Affairs
UL	University of Liberia
LISGIS	Liberian Institute of Statistics and Geo-Information Services
LTC	Libtelco
FDA	Forestry Development Authority
NEC	National Elections Commission
PPCC	Public Procurement & Concession Commission
LPRC	Liberia Petroleum Refining Company
NPA	National Port Authority

EXECUTIVE SUMMARY

INTRODUCTION

This document is a report assessing the Information and Communication Technologies (ICT) infrastructure penetration in the Government of Liberia (GoL) Ministries and agencies. The assessment included thirty ministries and agencies from the GoL entities. The information used for this assessment is a combination of results of surveys that measure the ICT penetration together with other readily available information on ICT obtained from a number of sources and personal interviews with key persons related to ICT field in GOL.

The GoL ICT Infrastructure is in general at a very weak state, regarding Information technology usage, connectivity and awareness. Although there are several activities going on in different ministries to improve the ICT Infrastructure and usage but the lack of coordination and planning is causing delays, wasting resources and money.

The objective of this assessment is to (a) Identify current level of penetration of ICT in GoL; (b) Recommend technical skills required to improve ICT capacity; (c) Identity common business processes among GoL entities; (d) List available and required software packages, needed to automate the business processes; (e) Recommend standards for implementing messaging systems among GoL; (f) Recommend interoperability standards for interfacing and/or integrating different business applications in GoL; (f) present guidelines and recommendations for Human technical capacity building, identifying skills and training required on short and long term plans; (g) Recommend the ICT organization structure in GoL, defining the role and qualifications of the chief information officer in GoL ministries; (h) identify the steps required for preparing e-government initiatives, high level definition of standards and organization structure that will manage e-government projects and; (i) identify the possible candidates in GoL ministries to take leadership as potential CIOs.

STATE OF TECHNOLOGY IN GOL MINISTRIES

- Most of GoL Ministries are using computers for normal office operations, document processing and spreadsheets; only 30% of the ministries have business application systems.
  - 70% of the ministries have no development plans and no allocated budgets for ICT.
  - 90% has internet connectivity, consuming almost 40% of budget allocated to IT.
  - 85% has shortage in the main technical skills required to operate an efficient IT department and ICT usage such as network administrators, hardware technicians and help disk support.

MAJOR GAPS THAT NEED TO BE ADDRESSED AND RECOMMENDED ACTIONS

- ICT Sector development in general is at an early stage; MoPT as sector leader are having major shortage of ICT technical Skills, capacity and infrastructure.
  - Recommended to have a permanent ICT Advisor for planning and support.
  - High level training program need to be implemented for the top executives in MoPT to cover ICT Projects planning, and national infrastructure.
  - Establish an ICT department in MoPT to handle all technical development and Infrastructure building in MoPT and to act as a support coordination center for line ministries.

- There is no adequate communication channel between GoL ministries when it comes to ICT, all development initiatives are based on individual initiatives with no coordination with other ministries or stakeholders.
  - Establish Chief information Officer Regime (CIOs and CIO council) which will act as a cross cutting information exchange and sharing layer in GoL.
  - Establish Project Management Office (PMO) Office in MoPT to coordinate all ICT national projects, e-government implementation and to ensure standards and efficiency.
- There are no physical networking of any kind between GoL ministries and agencies. All information exchange is done through emails and hard copies, which inhibit the chance to establish automated business processes across ministries.
  - Ideal solution will be to build a physical network between all ministries and agencies, using fiber optic cables; however such solution requires big budget and support.
  - Another solution is to build a Virtual Private Network (VPN) through the internet, where each ministry will have its own Fixed Real IP Address, and virtually connecting to other ministries, however this solution is hard to implement due to current limitations in bandwidth.
  - Liberia became an eligible member of the Submarine cable running from Europe (ACE) consortium, and broadband will be enabled to the country by early 2012.
  - LTC has already started building a fiber optic Ring in Monrovia, connecting major entities in GoL, the recommendation in this Gap is to support the national operator (LTC) to build the network, providing funding to connect as much possible ministries and agencies to this network.
- Human resources technical capacity in GoL ministries needs a phased training program to build the capacity of the ICT Department in each ministry.
  - This report provide detailed guidelines reflecting the needs of each ministry for each technical aspects, and the standard training programs that should be conducted per each aspect.
- ICT Educational in general and specifically University of Liberia is not taking enough focus from the education board and MoE, which doesn‘t support the ICT development and capacity building in Liberia.
  - Syllabuses must be developed to incorporate world standard education ICT.
  - New Computer labs are required; the current lap is very poor and running 10 years old computers.

BUSINESS REQUIREMENTS

ICT business needs in Liberia are enormous; the lack of ICT in the way business is conducted currently is causing massive delay and loss of time, resources and money. The business needs in Liberia are divided into four main categories:

- **Government to Government** business, where ministries need to participate in the completion of the same business processes. (e.g. Civil servants recruitments is shared between line ministers, CSA and MOF)
- **Government to Private Sector** business, involving processes between the GoL ministries as a party and private sector entities as the second party, where various ICT interfacing needs to be done between the two parties. (e.g. Customs, tax collections, companies registration, mining and timber industries)
- **Government to Citizens** where the government provides its services to the people of Liberia, citizens and residents. (e.g. driving licenses issuing, Birth Certificates, water and electricity bills).
- **Private Sector to Citizens** where the business involves one private sector company as a service provider, and the citizens and residents in the country as service consumers (e.g. banks, telecommunications and cell phones services, Internet providers, training centers)
- In the four models of conducting business, numerous needs exist for ICT to create, enhance and develop the way of conducting business, solutions to such needs varies from simple cell phone messaging and emails, to e-governance and e-payment. In this report, the business needs, possibilities and scenarios as well as guidelines for e-government standards are introduced and addressed to serve as a base for the implementation projects that will be required in fulfilling such needs and fill in the gaps.

1. EXISTING ICT INFRASTRUCTURE AND CAPACITY

1.1. CURRENT STATUS

Within GoL, entities use many different architectures and systems. Most are not interoperable, making it difficult (often impossible) to offer shared or integrated services to users.

Although government-wide networks and nationwide broadband are evolving, access to technology and ICT literacy remain problems both within government and Liberian society generally.

ICT Education in Liberia is not developed, syllabuses are outdated, and computer labs are inadequate with old computers and operating systems (Win 95). Although some recent improvement in University of Liberia ICT Infrastructure has taken place with donated equipments from India, a lot more needs to be done to bring UL's ICT Infrastructure up to international standards.

ICT Education needs to have a new perspective, contents of the computer related courses has to be developed to meet up to date technologies and standards with the focus to graduate a well educated IT workforce, who can participate in the development of the ICT sector in Liberia and its economic development.

Significant changes in ICT infrastructure, however, are coming. Liberia has signed for broadband connection through a submarine cable from Europe (ACE), in addition to the building of inner-fiber optic ring connecting most of the government agencies and ministries. The ICT Stakeholders in the country are more aware now of the challenges and requirements. The Government has developed a national ICT policy to be implemented in the next five years (2010-2015); this is a key step in the ICT development in Liberia.

With the combination of broadband coming to Liberia, the construction of the Monrovia Fiber Optic Ring and the passage of telecommunication law of 2007, the passage of the new ICT Policy and the improvement to the regulatory regime to promote a transparent ICT Sector, the market forces will recognize and benefit from these recent developments.

1.2. FINDINGS

In this section, the actual results from the surveys done are presented in a matrix format; the outputs are divided into the following charts:

1. **IT departments and networking**

   The chart shows the state of readiness of the IT department in each ministry/Agency, along with the number of workstations and servers, internet connectivity and security.

   This chart should be a guideline for top management to evaluate their IT department progress in the mentioned areas.

2. **Number of technicians in each field:**

   This chart shows the number of skills available in each ministry, with the total number of technicians.

   The Total number of skills may not be equal to the number of employees due to the fact that some technicians are doing more than one role and function.

3. **Internet availability and number of internet users.**

   This chart shows the number of connected workstations to the internet, the service provider and security status.

   This chart is provides information that can be used to re-plan the distribution of service providers in order to reach more cost effective deals, and to share connectivity as backup links for ministries /agencies that are geographically possible to share connection.

4. **ICT Planning and budgets**

   This chart shows the number of persons responsible for planning for ICT Development in each ministry, an evaluation of the skills of the IT Director and the budget allocated to the IT Department.

   This chart is useful for MPEA to use as a planning guide and to guide ministries that has no plans or budgets for ICT to start working on it.

1.2.1. IT Departments and Networking

Ministry/ Agency	No. of Employees	IT Director Evaluation	Budget	No of PCs	No. of Servers	N/W	Network OS	Have Internet	No. of Internet Users	Have Firewall	Have Antivirus	Secured Environment
MoF	21	100%	300000	400	8	No	2003	Yes	100	No	No	Yes
MoE	6	70%	NA	110	1	No	2003	Yes	40	Yes	No	No
MoPW	6	80%	400 000	150	2	No	2003 /Linux	Yes	150	Yes	Yes	Yes
MoL	10	40%	NA	88	1	Yes	2003	Yes	20	No	Yes	No
MoC	5	10%	NA	70	0	No	NA	Yes	30	No	No	N0
MoT	1	10%	40000	56	0	No	NA	no	NA	No	NA	No
MoPT	0	NA	NA	>10	0	NA	NA	Yes	NA	No	No	No
MoND	2	50%	60000	100	0	No	NA	Yes	50	Yes	Yes	No
MoJ	2	30%	NA	90	0	No	NA	Yes	15	No	No	No
CBL	9	80%	500000	150	16	Yes	2003	Yes	150	Yes	Yes	Yes
GSA	14	80%	10000	18	2	Yes	2003	Yes	18	No	Yes	Yes
CSA	4	100%	20000	55	2	No	2003	no	20	No	Yes	No
GAC	12	70%	20000	200	0	NA	NA	Yes	NA	No	NA	No
LTA	1	50%	20000	<20	0	No	NA	Yes	NA	No	No	No
MoIA	2	90%	14000	40	0	No	NA	Yes	NA	No	No	No
MoH	6	90%	NA	243	1	No	2003	Yes	100	Yes	Yes	No
MPEA	3	60%	NA	72	1	No	2003	Yes	39	No	Yes	No
MoA	4	100%	40000	125	2	No	2003 2008	Yes	NA	No	No	Yes
MLME	1	30%	NA	28	1	No	2003	Yes	42	Yes	Yes	Yes

Ministry/ Agency	No. of Employees	IT Director Evaluation	Budget	No of PCs	No. of Servers	N/W	Network OS	Have Internet	No. of Internet Users	Have Firewall	Have Antivirus	Secured Environment
MICT	1	10%	NA	50	0	NA	NA	Yes	NA	No	No	No
MoS	4	80%	60000	75	2	yes	2003	Yes	25	Yes	Yes	No
MoFA	5	30%	NA	50	1	No	2003	Yes	9	No	No	No
UL	11	30%	NA	18	0	No	NA	NA	NA	No	No	No
LISGIS	7	80%	NA	100	2	Yes	2003	Yes	80	Yes	Yes	No
LTC	7	100%	NA	<20	Switch	NA	2003	Yes	No	Yes	Yes	Yes
FDA	4	80%	NA	63	1	No	2003	Yes	40	No	Yes	No
NEC	7	100%	2 M	54	2	Yes	2003	Yes	all	Yes	Yes	Yes
PPCC	1	80%	NA	18	0	No	NA	Yes	10	No	No	No
LPRC	7	100%	150000	140	6	Yes	2003	Yes	110	Yes	Yes	Yes
NPA	4	NA	NA	60	2	Yes	2003	Yes	16	No	No	No

1.2.2. Number of Technicians in Each Field

Ministry/ Agency	No of Employees	Developers DBA	Tech. Support	Security	N/W Admin	Training	Data Entry	Planning
MoF	21	1	4	2	4	3	5	2
MoE	6	0	6	2	4	3	0	1
MoPW	6	1	2	2	2	3	0	0
MoL	10	0	2	1	1	2	5	0
MoC	5	0	2	0	0	3	3	0
MoT	1	0	1	0	0	0	0	0
MoPT	0	0	0	0	0	0	0	6
MoND	2	0	2	1	1	0	0	2
MoJ	2	0	2	0	0	0	0	0
CBL	9	3	3	4	4	1	0	1
GSA	14	0	4	1	4	4	8	1
CSA	4	1	1	0	1	0	0	1
GAC	12	0	3	0	2	3	3	1
LTA	1	0	1	0	1	0	0	1
MoIA	2	0	2	2	2	2	0	1
MoH	6	0	3	2	3	2	0	2
MPEA	3	0	3	1	3	2	0	1
MoA	4	0	3	3	3	0	0	1
MLME	1	0	1	0	1	0	0	0
MICT	1	0	1	0	0	0	0	0
MoS	4	0	2	2	2	0	0	1
MoFA	5	0	3	0	1	0	0	0
UL	11	1	4	0	2	3	0	0
LISGIS	7	0	4	2	2	0	0	2
LTC	7	0	7	0	0	0	0	1
FDA	4	0	2	1	1	0	0	0
NEC	7	2	4	1	4	0	0	3
PPCC	1	0	1	0	1	0	0	0
LPRC	7	2	2	1	1	0	0	1
NPA	4	0	3	0	1	0	0	0

1.2.3. Internet Availability, Number of Computers Connected and Internet Security

Ministry/ Agency	No of Computers	No. of Connected Computers	Have Internet	ISP	Have Firewall	Have Antivirus
MoF	400	100	Yes	Libtelco	NA	No
MoE	110	40	Yes	Cellcom	40 Gate3	No
MoPW	150	150	Yes	Cellcom	FireFox	Yes
MoL	88	20	Yes	West Africa Telecom/Cellcom	NA	Yes
MoC	70	30	Yes	Cellcom	NA	No
MoT	56	0	No	Libtelco	NA	No
MoPT	10	0	Yes	Libtelco	no	No
MoND	100	50	Yes	Power Tech	Cyber Roam	Yes
MoJ	90	15	Yes	Cartar Center–ISP	NA	No
CBL	150	150	Yes	Gillat	Sonic Wall	Yes
GSA	18	18	Yes	comuim	NA	Yes
CSA	55	20	No	NA	NA	Yes
GAC	200	0	YEs	Libtelco	NA	NA
LTA	20	0	Yes	Libtelco	NA	No
MoIA	40	0	Yes	Libtelco	NA	No
MoH	243	100	Yes	Power Tech	Cyber Roam	Yes
MPEA	72	39	Yes	Libtelco / Cellcom	NA	Yes
MoA	125	0	Yes	Power Tech	NA	No
MLME	28	42	Yes	Libtelco	Norton	Yes
MICAT	50	16	Yes	Cellcom	NA	No
MoS	75	25	Yes	NAS Global	40 Gate3	Yes
MoFA	50	9	Yes	Commuim	NA	No
UL	18	0	NA	NA	NA	No
LISGIS	100	80	Yes	Electric Shock	ISA Server	Yes
LTC	<20	All	Yes	Libtelco	Linux	Yes
FDA	63	40	Yes	Gillat	NA	Yes
NEC	54	all	Yes	Power Tech	Cyber Roam	Yes
PPCC	18	10	Yes	Libtelco	NA	No
LPRC	140	110	Yes	Gillat	Cyber Roam	Yes
NPA	60	16	Yes	Neo IP	NA	No

1.2.4. ICT Budgets and Plan Development

Ministry/ Agency	Personnel participating in planning	IT Director Evaluation	Budget	Has plan
MoF	3	100%	300000	Yes
MoE	1	70%	NA	Yes
MoPW	0	80%	400 000	No
MoL	0	40%	NA	No
MoC	0	10%	NA	No
MoT	0	10%	40000	No
MoPT	6	No IT Department	NA	No
MoND	2	50%	60000	No
MoJ	0	30%	NA	No
CBL	1	80%	500000	Yes
GSA	1	80%	10000	Yes
CSA	1	100%	20000	Yes
GAC	1	70%	20000	No
LTA	1	50%	20000	No
MoIA	1	90%	14000	Yes
MoH	2	90%	NA	No
MPEA	1	60%	NA	Yes
MoA	1	100%	40000	Yes
MLME	0	30%	NA	No
MICT	0	10%	NA	No
MoS	1	80%	60000	No
MoFA	0	30%	NA	No
UL	0	30%	NA	No
LISGIS	2	80%	NA	No
LTC	1	100%	NA	Yes
FDA	0	80%	NA	No
NEC	3	100%	Avg: 2 M	No
PPCC	0	80%	NA	No
LPRC	1	100%	150000	Yes
NPA	0	No IT Director	NA	No

2. ICT ACROSS GOL MINISTRIES

This section summarizes the ICT penetration in the GoL ministries and agencies with respect to business processes, available and required software packages and tools.

Section 2.3 provides guidelines for implementing proper messaging system between GoL ministries and agencies, in addition to the requirements needed to upgrade the current email topology to the recommended topology for all GoL.

Section 2.4 summarizes the main features required in general and most commonly used and required business application systems.

2.1. KEY CROSS-MINISTERIAL BUSINESS PROCESSES

How to read the chart

- Horizontal Ministries are the owner of the service, providing it to the marked ministries.
- Vertical Ministries, are Using the services that are marked in their Column.

Code	Process	Description
1	**IFMIS**	Integrated Financial Management Information System, A cross Ministries Financial Management MIS, include General ledger, Budget, Procurement, Account payables, Payroll and Cash management
2	**National Biometric ID**	A national Identification Code for the Citizens of Liberia, The National ID is a unique identifier to the person, who was born in Liberia and has the Liberian Citizenship.
3	**National Audit**	National Internal Audit MIS, crossing all ministries and agencies.
4	**Government HR System**	HRMIS System, to be included in IFMIS System, A Cross Ministries standard HR System to be used in all connected ministries
5	**E-procurement**	E-procurement is a unified portal for Government tenders, RFQs, and automation of procurement procedures. It has to be linked to the Purchasing module in IFMIS and will be used by procurement departments in all ministries.
6	**ASYCUDA**	Automated System for Customs Data, A financial customs system that has to be installed in all borders custom points. It's Managed by Ministry of Finance, currently hosted at the Free Port of Liberia.
7	**Asset Management, National Inventory**	National Asset Management process, requiring the involvement of all government entities, and State owned enterprises, to keep track of their assets belonging to the government. This system should be managed by GSA, and will be accessed by all Ministries and agencies.
8	**Birth Registration**	Registration of new born babies, currently operating in Ministry of health, required integration with CSA National ID system, to produce national ID for future generations on birth.

Code	Process	Description
9	**Aid Management**	Financial Aid Management, currently operating in the Ministry of Finance, and managed by Ministry of Finance. This system is accessed by Ministry of State and the Ministry of Planning and economic affairs.
10	**National statistics (LISGIS)**	Statistical analysis software, currently operating in LISGIS, however need to be upgraded and extended to key ministries that provide LISGIS with Information. (MOH, MOE,MOF,CSA,GSA)

BUSINESS PROCESSES USED ACROSS MINISTRIES															
Agency	**MoF**	**MoE**	**MoPW**	**MoL**	**MoC**	**MoT**	**MoPT**	**MoND**	**MoJ**	**CBL**	**GSA**	**CSA**	**GAC**	**LTA**	**MoIA**
MoF	1,9	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MoE												4			
MoPW												4			
MoL												4			
MoC												4			
MoT												4			
MoPT												4			
MoND												4			
MoJ												4			
CBL	1											4			
GSA	7	7	7	7	7	7	7	7	7	7	7	4,7	7	7	7
CSA	2	2	2	2	2	2	2	2	2	2	2	2,4	2	2	2
GAC	3	3	3	3	3	3	3	3	3	3	3	3,4	3	3	3
LTA												4			
MoIA												4			
MoH												4			
MPEA												4			
MoA												4			

BUSINESS PROCESSES USED ACROSS MINISTRIES															
Agency	**MoF**	**MoE**	**MoPW**	**MoL**	**MoC**	**MoT**	**MoPT**	**MoND**	**MoJ**	**CBL**	**GSA**	**CSA**	**GAC**	**LTA**	**MoIA**
MLME												4			
MICAT												4			
MoS												4			
MoFA												4			
UL												4			
LISGIS	10	10									10	4,10			
LTC												4			
FDA	1											4			
NEC												4			
PPCC	5	5	5	5	5	5	5	5	5	5	5	4,5	5	5	5
LPRC												4			
NPA	1,6											4			

BUSINESS PROCESSES USED ACROSS MINISTRIES—CONTINUED															
Agency	**MoH**	**MPEA**	**MoA**	**MLME**	**MICAT**	**MoS**	**MoFA**	**UL**	**LISGIS**	**LTC**	**FDA**	**NEC**	**PPCC**	**LPRC**	**NPA**
MoF	1	1,9	1	1	1	1,9	1	1	1	1	1	1	1	1	1,6
MoE															
MoPW															
MoL															
MoC															
MoT															
MoPT															
MoND															
MoJ															

BUSINESS PROCESSES USED ACROSS MINISTRIES—CONTINUED															
Agency	**MoH**	**MPEA**	**MoA**	**MLME**	**MICAT**	**MoS**	**MoFA**	**UL**	**LISGIS**	**LTC**	**FDA**	**NEC**	**PPCC**	**LPRC**	**NPA**
CBL															
GSA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
CSA	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
GAC	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
LTA															
MoIA															
MoH															
MPEA															
MoA															
MLME															
MICAT															
MoS															
MoFA															
UL															
LISGIS	10		10								10			10	10
LTC															
FDA															
NEC															
PPCC	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
LPRC															
NPA															

The chart above shows that there are a few ministries are playing a very important role in providing information sharing and consolidation services, it is highly recommended that those ministries to be considered as high priority when allocating national ICT development budget, and implementing e-government. Providing adequate ICT Infrastructure and connectivity to those ministries will help GoL to maintain fast return of investment in the form of better governance and transparency, as well as automating the most critical governmental processes, and hence saving a lot of future costs that is being currently spent on those processes.

It is also highly recommended when development connectivity plans, to make sure that the following ministries are properly connected to the national backbone (Broadband connection and fiber optic ring) in order to secure their ability to provide their services to the rest of the government ministries and agencies, as well as the private sector and people of Liberia.

The following Ministries are the service providers for most common used business processes, and hence require a good infrastructure to support hosting and running their business applications:

1. Ministry of Finance (MOF)
2. Civil Services Agency (CSA)
3. General Services Agency (GSA)
4. Public Procurements (PPCC)
5. General Auditing committee (GAC)

The following Ministries are the highest consumers of services provided by the above ministries:

1. Ministry of Health (MoH)
2. Ministry of Education (MoE)
3. Ministry of Public works (MoPW)
4. Civil Services Agency (CSA)

Those ministries must have a proper internet connection in their buildings and county offices, in order to be able to properly use services provided by other ministries and to later to be able to develop their services for e-government.

2.2. AVAILABLE AND REQUIRED SOFTWARE TOOLS IN GOL

AVAILABLE AND REQUIRED SOFTWARE TOOLS IN GOL									
Ministry/ Agency	**Biometric HR MIS**	**Payroll MIS**	**Procurement MIS**	**Accounting**	**Internal Audit MIS**	**Email Server**	**CRM**	**Inventory Management**	**Document Management and Electronic Archive**
MoF	R	R	R	R	R	R	R	R	R
MoE	R	R	R	R	R	R	R	R	R
MoPW	R	A	R	A	R	R	R	R	R
MoL	R	R	R	R		R	R		
MoC	R	R	R	R		R	R		
MoT	R	R	R	R	R	R	R		
MoPT	R	R	R	R		R			
MoND	R	R	R	R		R		R	
MoJ	R	R	R	R	R	R			R
CBL	R	A	R	A	R	R	R		R
GSA	R	R	R	R	R	R		R	R
CSA	R	R	R	R	R	R			R
GAC	R	R	R	R	R	R			R
LTA	R	R	R	R		R			
MoIA	R	R	R	R		R			
MoH	R	R	R	R	R	R	R		R
MPEA	R	R	R	R		R			
MoA	R	A	R	A	R	R	R	R	
MLME	R	R	R	R	R	R	R	R	
MICT	R	R	R	R		R			
MoS	R	R	R	R	R	R			
MoFA	R	R	R	R	R	R	R		

AVAILABLE AND REQUIRED SOFTWARE TOOLS IN GOL									
Ministry/ Agency	**Biometric HR MIS**	**Payroll MIS**	**Procurement MIS**	**Accounting**	**Internal Audit MIS**	**Email Server**	**CRM**	**Inventory Management**	**Document Management and Electronic Archive**
UL	R	R	R	R		R	R		R
LISGIS	R	R	R	R		R			
LTC	R	R	R	R		A	R		
FDA	R	R	R	R	R	R		R	
NEC	R	R	R	R		R			
PPCC	R	R	R	R	R	R			R
LPRC	R	R	R	R	R	A	R	R	R
NPA	A	A	R	A	R	R	R	R	R

R: Required A: Available R-A: Required & Available

AVAILABLE AND REQUIRED SOFTWARE TOOLS IN GOL—CONTINUED							
Ministry/ Agency	**Workflow and Process Management**	**GIS System**	**Statistical Analysis**	**Birth and Drug Management**	**Banking Supervision**	**Project Management**	**Planning MIS**
MoF	R						
MoE	R					R	R
MoPW	R	A				R	R
MoL			R-A				
MoC			R				
MoT							
MoPT							
MoND							
MoJ	R						
CBL	R				R		
GSA	R	R	R				
CSA	R						

AVAILABLE AND REQUIRED SOFTWARE TOOLS IN GOL—CONTINUED							
Ministry/ Agency	**Workflow and Process Management**	**GIS System**	**Statistical Analysis**	**Birth and Drug Management**	**Banking Supervision**	**Project Management**	**Planning MIS**
GAC	R						
LTA							
MoIA							
MoH	R		R	R-A		R	R
MPEA						R	R
MoA		R				R	R
MLME		R					
MICT							
MoS							
MoFA							
UL	R						
LISGIS			R				
LTC							
FDA		A				R	R
NEC			R				
PPCC	R						
LPRC	R						
NPA	R						

R: Required A: Available R-A: Required & Available

The above chart shows the most common required software in all GoL ministries, this chart can be used to assist in the procurement process for the software packages, standardizing the application systems for most entities, and hence, provide a better and cost effective procurement processes and better information exchange standards.

2.3. PROPOSED ARCHITECTURES FOR IMPLEMENTING MESSAGING SYSTEMS (E-MAIL SERVICE).

A Messaging system is the system that enables email service communications between different users from same/different entities. The design and implementation of messaging systems has different topologies and is affected by many factors that affect the performance, cost and reliability of email communications.

2.3.1. Messaging Topology:

A messaging topology is the design that describes the physical and logical layout of a networked messaging system. Specifically, a topology depicts the way the devices are arranged on a network and how they communicate with one another. In addition, a topology describes the way that data passes through a network. Topologies are bound to network protocols that direct the data flow.

Decision of choosing among different messaging topologies in large scale organizations and governments is based on the following factors:

1. Geographic Limitations
2. Communication links limitations
3. Nature of messages (Size, destination)
4. Infrastructure capabilities

Different Messaging Topologies:

a. Central Topology

Consolidates most or all major system components and messaging servers at a single location.

b. Distributed Topology

Spreads most or all system components and messaging servers across multiple sites.

c. Hybrid Topology

Consolidates some system components and distributes other components across multiple locations.

d. Service Provider Topology

Hosts multiple domains and handles larger customer base. Like a central topology, it consolidates most system components at a single location.

For more detailed description of each topology please refer to annex 3 (Messaging Service Topologies)

The Decision of choosing a specific topology in Government of Liberia ministries and agencies should be made based on the following facts and assumptions.

2.3.2. Current facts:

a. GoL Ministries has shortages in the following resources:

   i. Financial resources

   ii. Technical Support and Technical human capacity

   iii. Electric power sustainability.

Internet access limited connectivity.

No physical communication links between any of the GoL ministries

b. GoL Ministries has the following needs:

   i. A fast messaging system for internal communications between each Ministry offices.

   ii. A reliable messaging system for external communication between different ministries, as well as with other parties in the globe.

2.3.3. Short term future assumptions

a. GoL has signed the C&MA for having a Broadband Connection, that will be up and running by end of 2012.

b. GoL has started building an inner fiber optic ring that will connect all government entities through a reliable fiber optic network. The network will be operational by end of 2010 and the linking of different ministries will depend on the financial capabilities of establishing the connection nodes.

c. Liberia is in the process of rehabilitation of the Power Grid, and if this happens, the electric power shortage will not be a problem for in the future.

Considering the mentioned facts, it is safe to assume that Liberia will be better able to meet the challenges affecting the choice of the messaging system topology because the infrastructure will be significantly improved by 2012.

2.3.4. Conclusions and Recommendations

1. Needs:

   GoL Ministries has the following needs:

   i. A fast messaging system for internal communications between each Ministry offices.

   ii. A reliable messaging system for external communication between different ministries, as well as with other parties in the globe.

2. Constraints:

   a. Geographic Limitations

      GoL Includes more than 30 Ministries and Agencies, each has a different Building, and most of them have no internal network, however sharing internet access through wireless access points and poorly designed cable LANs.

      The Government buildings are mostly located inside Monrovia City in different areas, with no physical communication links currently in place.

   b. Communication links limitations:

      i. No (wired or wireless) communication links available between any of the ministries.

      ii. No connections (LAN/WAN) between the different buildings of the same ministry.

c. Nature of messages (Size, destination)

   i. GoL employees tend to send small size emails.

   ii. Approximately 85% of the communication in each ministry is local inside the same ministry.

   iii. Approximately 10% of the communications in each ministry is designated to other different ministries of GoL.

   iv. Approximately 5% of the external communication is designated to other countries.

d. Internal Infrastructure capabilities

   i. 90% of the ministries (27 out of 30) have internet access through different providers.

   ii. Only 25% has server rooms with proper security standards.

   iii. Only 25% of the ministries have technical staff capable of maintaining email servers.

3. Current Messaging system topology:

   a. All ministries are using the service provide topology, where emails are hosted in 3rd party servers outside Liberia, mostly in Lebanon and Israel.

   b. Each ministry has its own domain name (.LR Domain)

4. SWOT Analysis of the current system:

   a. Strengths:

      i. The current model provides guaranteed connectivity to outside of Liberia, provided the client sending/receiving the email message is connected to the internet.

      ii. Email Server is secured.

      iii. The cost is relatively small (annual fees), compared to centralized or distributed models.

      iv. No technical infrastructure required (Servers, firewalls, UPSs)

   b. Weaknesses:

      i. Internet connectivity is required even when sending an email to the computers in the same office. (Slow Performance, high traffic cost)

      ii. Internal communications in the same ministry has to pass through the server overseas.

      iii. Customer Support depends on the quality of service of the provider.

   c. Opportunities:

      The opportunity to change email service providers, and grouping ministries in same providers will allow more cost effective deals, and faster services in communication between ministries using same provider.

   d. Threats:

      i. Email Server is exposed to a 3rd party (Service Provider) which compromise the security of the content.

ii. Service provider can cut-off the service due to payment delays.

iii. Service provider can have downtime, which is out of the control of the GoL technicians.

The current topology is suitable due to the constraints mentioned above, however it is highly recommended to deploy the new recommended topology once the requirements for such topology is fulfilled.

5. Possible Options for Messaging Service in GOL

The hybrid topology is being excluded, as it is basically implemented by organizations with multiple sites, where each site is serving more than 500 users, provided that these sites has the ability to provide sustainable service which make it effective from performance point of view, however, in GOL ministries, the centralized and distributed topologies are more fitting the business needs due to previously mentioned facts.

The following is a comparison between the two feasible topologies (Centralized and Distributed, showing the Strengths, weakness, Opportunities and threats of each of them.

Topology	Centralized–One Email Server For All Ministries	Distributed–Local Server In Each Ministry
Strengths	1- One infrastructure, very low cost 2- Centralized technical team to manage, backup and restore 3- Cross ministries communications require only physical access to the WAN (Fiber Optic Ring). 4- Can operate on the level of the GOL without internet access. 5- Communications does not go overseas.	1- Each ministry has its own server 2- Each ministry has its own technical support 3- Internal ministry communications is local, not transferred out of the building, and hence support large email sending and files transfer without internet access. 4- Different platforms can be used.
Weaknesses	1- A disaster recovery site is required 2- Must have a dedicated call center support to serve all ministries. 3- Require a well established national data center and a 24/7 running service.	1- Communication outside the ministry must have reliable internet access. 2- Require a sustainable power supply, backup power or batteries. 3- If the server is off for any reason, or internet connection is off, inbound communications will fail to reach the server.
Opportunities	Reduction of cost of infrastructure building, setup and maintenance	Enable a reusable infrastructure inside the ministry, to be used in for other applications.
Threats	1- A disaster recovery site is required off-site. 2- If the data center is down by accident or deliberately, the communication between the government ministries, and between the outside world is not possible	Power failure or internet failure will take the server out of the global worldwide network (internet) and hence, no communication will be exchanged for this ministry.

6. Recommended Topology for GoL ministries

    a. The recommended topology for implementing Messaging system in GoL is to implement Distributed topology as follow:

        Each ministry should have the following items:

        - Email server : Recommended Microsoft Exchange Server 2010
        - Firewall : Recommended Microsoft ISA server
        - Fixed IP Address to publish the Exchange server
        - Other complementary package of Email Server (Client Tool, Directory Service and Internet-facing MTA)

    b. Pre-Requests for each Ministry to change Topology from the current topology to the recommended:

        - Each ministry should establish a well structured network, running under a domain control and a well defined directory.
        - The ability to provide an un-interrupted power supply to the email server and internet access devices (UPS, Stabilizers and batteries)
        - At least two technical support personnel and server administrator with proper training to install operate and maintain the email server.

    c. A secured Server room with proper air conditioning.

2.4. GENERAL FEATURES OF COMMON SOFTWARE PACKAGES AND INTERFACING GUIDELINES

The most common application systems required in GoL are Human resources management and payroll management, which are required for all ministries and agencies to have control over their resources. This section is listing the main required features in each of the two systems in order to support the procurement process and standardization for both systems.

2.4.1. Human resources management:

Human resource management MIS is an urgent need in all ministries and agencies, to automate the recruitment process, and integrate with CSA to help in automating the employment and management of civil servants.

The needs for all ministries can be fulfilled by multiple General HRMIS packages, provided they include the ability to interface with CSA HR System, to provide the following date integration:

1. New added employees
2. Dismissed employees
3. Updated employee‘s records.
4. Biographical information of employees

- **The current manual process steps are:**

    1. Line ministries send a notification document with the change. (PAN) to CSA.
    2. CSA changes the information in its records, and send the request manually to Ministry of Finance to process for payroll changes.

3. Ministry of finance process the request.
4. No feedback is returned to CSA or Line ministries to update the status of the request.

- **Using an automated HR System to manage employees records and transactions, will provide the following:**

1. Accurate records for all employees for internal management of line ministries.
2. A unified and standard communication channel between Line ministries, CSA and MoF.
3. The ability to feedback the line ministries with the status of the requests.
4. The ability for CSA to monitor the employment records for Civil Servants.
5. Increase transparency, accuracy and eliminate fraud operations in payroll and hiring.

- **Interfacing guidelines with CSA HR Component:**

  - Line ministries are free to procure Human resources packages that fit its size, number of employees and budget; however the following requirements must be available in any package.

    - Ability to extract specific information required by CSA into Excel, or CSV formats.
    - Ability to export information in XML format provided that the schema can be designed by the administrator; this ensures interoperability with CSA, MoF and future E-Gov. Projects.

2.4.2. Payroll Management

Ministry of Finance, as a part of the integrated financial management information system (IFMIS) –Payroll Module, will provide Line ministries with web based interface to the government payroll database, to access their own reports and to requests inputs for their transactions.

However, it is highly recommended to have a local payroll application in each ministry, to validate information and to record and calculate the net salaries of employees after bonuses, allowances, taxes, and deductions.

This will add a validation layer for employees who are not registered yet as Civil Servants, and still paid in forms of allowances.

A review of standards has to be done to ensure compatibility and interoperability with IFMIS.

Recommendations:

- Ministry of Finance should set standards for local payroll packages, to ensure integration with IFMIS requirements.
- Line Ministries should procure the packages that fulfill the standards predefined by MoF.
- Standardization is highly recommended in payroll applications in line ministries, ministries can be classified into 3 classes depending on the number of employees.

- Large Scale (>1500 employee)
- Medium Scale (500 – 1500 employee)
- Small scale (<500 employee)

GoL can negotiate procurement of one package with multiple licenses to ensure standardization and procurement cost reduction.

3. KEY AREAS OF INTEROPERABILITY IN GOL

Interoperable systems working in a seamless manner across the GoL are the key to providing better, faster, cost-effective services. Standards are essential for enabling interoperability between systems and components. Together with a portfolio of technical components, Standards should also encourage the re-usability of components and infrastructure between e-Government initiatives.

In addition to technical standards, it is important to standardize the core processes that guide Infrastructure development and e-Government implementation. As part of this effort, disseminating recommended methodologies and best practices helps promote common processes across government.

THERE ARE TWO AREAS OF INTEROPERABILITY:

Technical Interoperability:

This aspect of interoperability covers the technical issues of linking computer systems and services. It includes key aspects such as open interfaces, interconnection services, data integration and middleware, data presentation and exchange, accessibility and security services.

Organizational Interoperability

Is the aspect defining business processes and bringing about the collaboration of ministries and agencies that wish to exchange information and may have different internal structures and processes.

Organizational interoperability also includes the political, legal and structural conditions that are relevant to the development and use of interoperable applications. Such aspects should be considered and studied when implementing E-Government services involving the inputs of different ministries, however it is out of the scope of this assessment and report.

3.1. TECHNICAL INTEROPERABILITY

Internet-based services, including government eServices are available in a myriad of forms and appearances and offer a variety of interaction types, ranging from simple websites to interactive ways of doing business. In the context of e-Government services, a commonly used classification of these interaction types distinguishes the following sophistication levels:

- **Stage 1:** Online services only provide information. The consumer can read this information online or download it.
- **Stage 2:** Forms are available online. These can be downloaded and returned by post, fax or e-mail.
- **Stage 3:** Individual transactions between an administration and an enterprise or citizen are possible. Forms can be completed online and orders can be placed and paid for.
- **Stage 4:** Multiple transactions are possible, services are integrated and transactions between different ministries and enterprises and citizens are fully automated.

Although each of these stages describes eServices, the most challenging requirements for electronic interoperability are at the fourth stage. Stage 1 and Stage 2 mainly concern the interaction of the e-Government service with the user (front-office) where there is no automated electronic processing of the forms performed, whilst Stage 3 and especially Stage 4 involve

background electronic processing of the information provided and possibly electronic interactions with external systems from other administrations and/or from enterprises (back-office interoperability).

It is very important to consider phasing through these four stages while implementing e-government in Liberia, because this also involve the process of changing the culture of the people using the internet, and starting using the websites of the different ministries as a way to receive information, and interact with different government services in a simple way (stage 1) and growing to reach Stage 4, where the citizens and enterprises would have gained enough trust and experience to deal with an e-government infrastructure.

The technical interoperability is addressed in two dimensions in each of the four stages:

1. Front-office interoperability:
    - Data presentation and exchange
    - Accessibility - Interface design principles
    - Multi-channel access
    - Character sets
    - Collective authoring
    - File type and document formats
    - File compression
    - File type and document formats
2. Back-office interoperability:
    - Data integration and middleware (Databases and Information Sources)
    - XML-based standards (XBEL, FpML, XBRL, FIX, etc.)
    - EDI-based standards
    - Web Services
    - Distributed Application Architecture
    - Interconnection services
    - File and message transfer protocols
    - Message transport and security
    - Message store services
    - Mailbox access
    - Directory and domain name services
    - Network services

Technical Interoperability specifications and standards are addressed in details in Annex 4 (Technical specifications recommended for the Interoperability framework (IF) of GoL).

TECHNICAL INTERFACES THAT NEED TO BE ADDRESSED IN GOL:

1. Unique source of identification for all government employees. (CSA)
    a. All existing databases that address Government employees‘ records in different ministries must be consolidated to one national database.
    b. Each ministry can still have its own database with its own employee‘s data; however, there must be a standard interface to update all employees records in CSA, once changed in the Local Database.
    c. CSA Database should be the national authoritative Source of information for all government employees‘ queries.
    d. Other agencies that need to use such information, can has access through XML web services or other standard secured interfaces, to query and read the information based on pre-specified privileges. (NEC, MOH, MOE, GAC and others)
2. Private Sector companies registration
    a. All Databases in Ministry of finance, Ministry of commerce and City hall, must be consolidated and cleaned up, to form one verified and correct sources of information. The database can reside in a national Datacenter, or hosted in any of the ministries.
    b. All other information users can access this database and query information through Standards Secured XML interfaces and use it to conduct their business processes (Tax payments, Fees collection, Customs Payment for imports, etc.)
    c. The interfaces should define who has the access and the privilege to add/modify/delete the master records in the database, and the interoperability rules must force logging such changes.
3. E-Procurement :
    a. Option 1: Integrated procurement Portal
        i. Public sector procurements can be integrated into one national procurement system, which can be administrated through PPCC.
        ii. All procurement departments in all ministries should have access to this system, to create tenders, receive proposal and publish bidder‘s information and awards per ministry.
        iii. Having such system in place, can ensure the standardization of procurement operations in all the GoL.
    b. Option 2: Interoperable procurement packages
        i. Each Procurement department can have its own procurement MIS, *(standardization among ministries is highly recommended)*
        ii. The procurement business process must define the information and data required to be passed to different entities (MoF, PPCC), and such entities should have standard interfaces on their systems defining the formats of such information, and enforcing other procurement MIS to communicate using such formats.
        iii. Organization interoperability must be addressed in this model, because the procurement process will significantly change in the way it is performed in different ministries; therefore, the PMO should monitor and coordinate the

development of local procurement MIS in different ministries, and ensure that they are aligned with the PPCC and MoF interfaces standards.

4. Asset Management:

    a. GSA is the responsible Agency for asset management in GoL, however, each ministry must have its own asset management MIS, to be able to track its own assets changes.

    b. Interfaces should be established between GSA Asset and inventory Management system currently in place, in order to communicate the changes in Assets in local systems to GSA.

    c. GSA can have a published interface to allow ministries who have no asset management and tracking system to use GSA interfaces to update their assets and track it.

        i. Such interface should provide reports per Ministry/Agency on their own assets and how it should be compared to the actual recorded information.

    d. GSA can have interface to such reports to perform and prepare audits on different agencies and ministries.

3.2. ORGANIZATIONAL INTEROPERABILITY

Organizational interoperability means the organizational structures, business processes and personnel enable enterprise-wide and cross-enterprise information sharing, cooperation and collaboration.

The government ministries and agencies may need to reorganize to eliminate barriers to collaboration. Enterprises may need to reform the organizational structures, management hierarchy, mission statements, rules and leadership guidance to implement changes to information management, workflow and business processes. For example, historically, business processes were designed to meet needs internal to the ministry or agency. In e-government, the process must start with the service being consumed by the end user – the citizen, small business, industry or other government agency – and design business processes to provide the service most efficiently.

Individuals, whether staff or senior managers, need to adapt. As business processes and practices are altered or eliminated – managers may have to identify new means to measure productivity, transition the old revenue streams and methodologies to new processes and organizational structure, or identify new revenue streams. Workers at any level of the administrative hierarchy may feel threatened by new interconnectedness.

Challenges facing the implementation of organizational interoperability are usually the same in most of the countries; however in Liberia and West Africa in general, there are additional challenges that must be considered when implementing interoperability.

- **Change Management:**

    Government employees, who are considered the service providers, are being threatened by the organizational interoperability, since it involves re-organization of hierarchical structure, automation of business processes and change of Job content which leads to loss of status or power.

    One way to avoid such challenges is to include the major stakeholders, directors and division managers in the process of change, re-engineering of the business processes and restructures.

- **Technical Capacity Building:**

  Employees and users are used to the way business processes are being conducted, automation requires a different level of computer literacy and education.

  The government must make it a priority to develop proper training for, and achieve ―buy-in" by, all who manage and work for the enterprise, these are the people who will or will not implement the e-Government strategy.

- **Commitment to Openness and Interoperability**

  Electronic Information exchange protocols and Acts must be established between different agencies and ministries, in order to facilitate the delivery of accurate services and to promote transparency. And to eliminate the ownership of information to a single entity, instead promote the sharing of information rights between ministries.

  Good approaches are to identify the commonly used information and unify the source, responsibility of updating and maintaining this source into one agency or ministry, and establish technical interfaces to use such sources when needed by different business processes. (e.g. CSA is the only source for the Identification of citizens, other Identifications like driving license or payroll ID should only be used locally for their business target, but not for identifying citizens as a citizen of Liberia).

3.3. INTEROPERABILITY FRAMEWORK (IF)

The Interoperability Framework (IF) supports the Government's strategy of providing client-centric joined-up services by facilitating the interoperability of technical systems between Government departments, as well as between Government systems and systems used by the public (including citizens and businesses).

The IF defines a collection of specifications aimed at facilitating the interoperability of Government systems and services. By bringing together the relevant specifications under an overall framework, IT management and developers can have a single point of reference when there is a need to identify the required interoperability specifications that should be followed for a specific project. By adopting these interoperability specifications, system designers can ensure interoperability between systems while at the same time enjoy the flexibility to select different hardware, and systems and application software to implement solutions.

The framework applies to both Government to Government interactions and Government to public interactions. It has no binding whatsoever on electronic interactions among members of the public (including businesses) themselves. All new e-Government infrastructure systems, new Government to public (including businesses) systems, and new inter-Bureau and Department (B/D) systems must be developed based on the IF. It is strongly recommended that all other new systems conform to the IF, as appropriate.

For existing systems, given the diversity of current platforms and systems, conformance to certain specifications may not be readily achieved. Existing systems are required to consider conformance to the IF only when there is a new requirement for government to public integration or inter-B/D integration, and only in respect of the modifications that specifically relate to external interfaces. Migration to the IF must be considered when a major functional change is being performed. In either case, connection or changes to existing systems are required to conform to the IF only when it is financially and functionally prudent to introduce compliance with the IF.

The development of an IF for e-Government is a long-term, ongoing strategy that must be continually reviewed and updated. Given the emergence of new business requirements and the pace of technological advancement, there are likely to be frequent changes to the specifications. The technical specifications under the IF will be reviewed every 6 to 12 months.

Interoperability Frame work is described and detailed in annex 4.

4. E-GOVERNMENT IMPLEMENTATION GUIDELINES

4.1. NEED FOR E-GOVERNMENT

Liberia's long-term success in e-Government will require continued evolution of institutions that will be accountable for its e-Government policies and initiatives. E-Government requires robust institutional mechanisms. They are an absolute necessity to manage the complex mix of technologies, information, business processes and projects involved in e-Government. For this reason, Institutional Framework is the first pillar of e-government.

Approaches to e-Government vary globally. Different countries use different institutional arrangements for e-Government. However, at least three best practices are clear. Success in e-Government requires:

- Effective inter-agency coordination within a clear institutional framework;
- Centralized, accountable e-Government authorities; and
- Direct, regular access of e-Government authorities to political leaders.

In reality, this typically involves a combination of high-level political engagement, inter-ministry working groups to coordinate policymaking and supervise e-Government performance, and agency-level teams to manage services and projects.

The organizational challenges facing e-Government institutions in Liberia are considerable. Many of these challenges—like inadequate information sharing and sustaining political will—impact all e-Government stakeholders. ICT Infrastructure and external connectivity is a major challenge in Liberia.

Without strong inter-agency coordination and "buy-in" the risks of duplication, interoperability gaps, project failure and user dissatisfaction are substantial. E-Government is almost always cross governmental at some level. Without serious inter-agency coordination, service-oriented, customer centric e-Government is impossible.

Leadership—at the highest levels and within institutions—is essential for e-Government success. E-government is a new concept for most Liberians. It takes time for officials and the public to embrace it. The people, who make policies, approve budgets, manage and provide services all need to support e-Government over the long term.

It is a mistake to underestimate the effort and energy needed to create awareness, reengineer processes, manage information, and develop champions who will provide the necessary leadership and strategic thinking. Among other things, this must involve the attention of Liberia's political leaders.

4.2. ICT FOR E-GOVERNANCE

The Government of Liberia needs to rely upon a good ICT infrastructure to enable their service delivery to users. ICT infrastructure is a prerequisite to efficient government operations.

ICT infrastructure challenges in Liberia are understandably significant. There is a shortage of ICT resources, and much of the existing infrastructure is inadequate for the Government needs. Many entities lack adequate systems and information security standards for managing and processing electronic data. Interoperability among systems is very low in most of the ministries even if it exists. Too often, one agency's systems and solutions do not work with those of other entities. Information cannot be shared; services are not delivered efficiently.

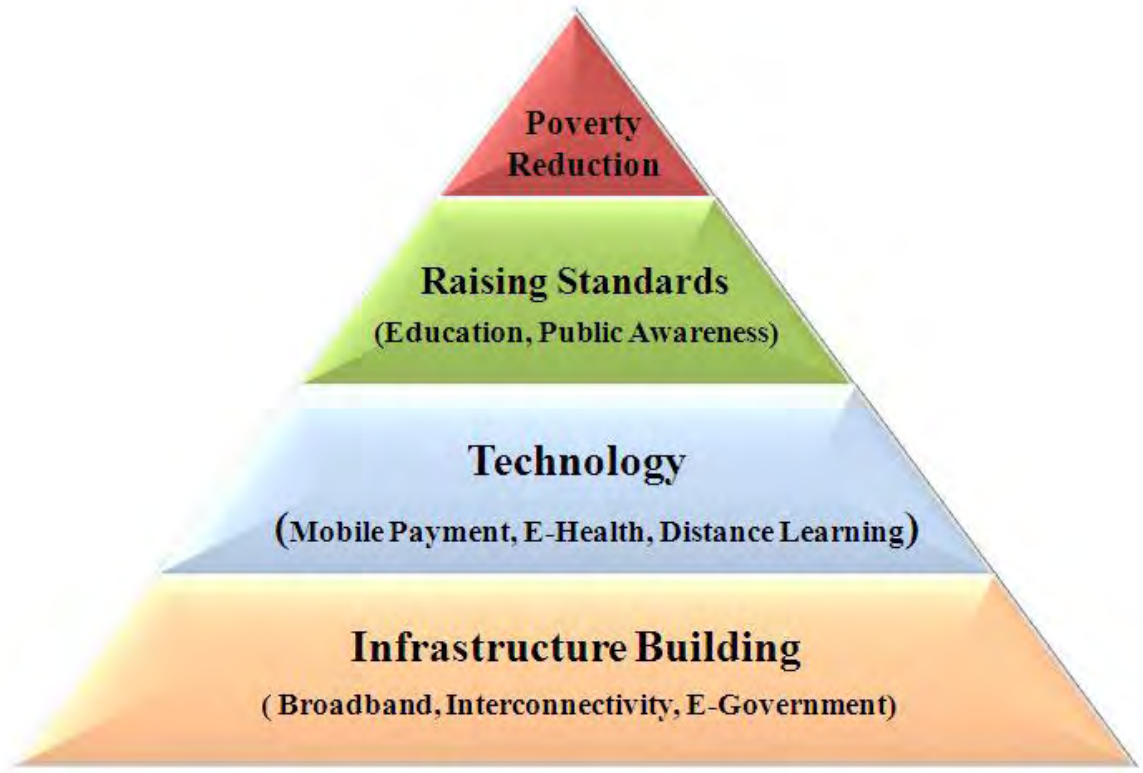
At the ICT level, traditional Governance and E-Government are best served by establishing common technological standards that applies to all government entities and other stakeholders (e.g., industry providers) and their individual ICT architectures. This will enable government entities and their provider partners to deliver e-Government services in an integrated manner.

E-Government ICT infrastructure is not a one-time expense; it is a long-term investment. In particular, the investment needed to build or upgrade the technology base needed for e-Government is substantial.

Yet, building out Liberian‘s ICT infrastructure is critical to e-Government services and the country‘s long term development. Also, e-Government is an economical project that will pay back in the long-term in terms of enhanced productivity, economies of scale, lesser duplication of investments.

E-Government requires budget cycles that will adequately support the development and rollout of e-Government infrastructure and services detailed in the Roadmap. Financing is an important aspect of e-Government sustainability. In addition to public expenditures, the e-Government Program will increasingly look for opportunities for alternative financing and risk allocation, including financing by NGOs, and use of public – private partnerships. In addition to the mentioned benefits, these partnerships may also provide alternative options for the challenging task of operating the required infrastructure.

Figure 1. Need for e-Governance—A Hierarchal Presentation of the Main Needs



4.3. SCENARIOS FOR MOVING TOWARDS E-GOVERNMENT

The scenarios described in this section provide an indication of how the GOL could control and evolve future E-Government initiatives in order to satisfy the information needs required for e-governance. This transformation will require the implementation of networks, computer applications, and fundamental cultural changes to the way the civil service operates.

Many IT initiatives involving Web technology already under way within the different entities of the GOL:

- Most Ministries now have some degree of presence on the Internet with Web sites ranging from the very basic (with limited static information that is clearly not regularly updated) to medium level of sophistication and a periodic update of content to reflect the progress of the ministry.
- **LPRC** has accomplished a step ahead by implementing an intranet, using document and file sharing portal for its internal use.
- Some institutions are already planning to implement Web applications in the next one to three years. (MoF, CSA ,PPCC & GSA)

There is currently a lack of co-ordination in terms of project management and Web application design—all the government institutions are conducting individual initiatives on their own, depending on their contractor. This means that some ambitious projects have already started whilst less ambitious ones have not yet been considered.

The over-ambitious projects have probably already resulted in the duplication of effort and resources. The omission of the less ambitious projects undoubtedly means that opportunities for learning have been lost. To minimize these problems in future it is important to view Web applications within the context of a set of scenarios that allows them to be classified and therefore evolved in a meaningful way.

Consideration of the e-Government Maturity Model (see figure 1) demonstrates how the pursuit of an evolutionary approach to developing Web applications results in the accumulation of experience that lays the foundations for the next step.

Information Phase, The earliest phase in the e-Government Maturity Model is the Information phase. In this stage government institutions publish information on Internet Web sites which often incorporate simple Web applications. There is usually little coordination between the institutions of government. GOL has already reached this phase.

The Interaction phase – the users (citizens, businesses, etc.) and the government institutions interact through increasingly complex Web applications. These often start with email and simple Web applications on Internet Web sites. Inside the government, the various departments and ministries begin sharing information through use of shared applications over an intranet. GOL is just entering this phase.

The Transaction phase, by this point the Web applications are more sophisticated and are combined in different ways to deliver e-services.

We can use scenarios to create a high-level plan for the evolution of the Web application component of the GOL e-Government initiatives (figure 2).

Scenario 1—Sharing Information Outside the Government (G2C & G2B)

In this scenario simple applications are used to increase the speed and quality of information exchange between government and the stakeholder groups that it serves (citizens, the private

sector, foreign businesses, foreign tourists, etc.). The applications include email, simple applications on Internet Web sites, Web sites providing single points of contact (which will eventually evolve into Internet Portals) and third-party services (applications) such as e-recruitment.

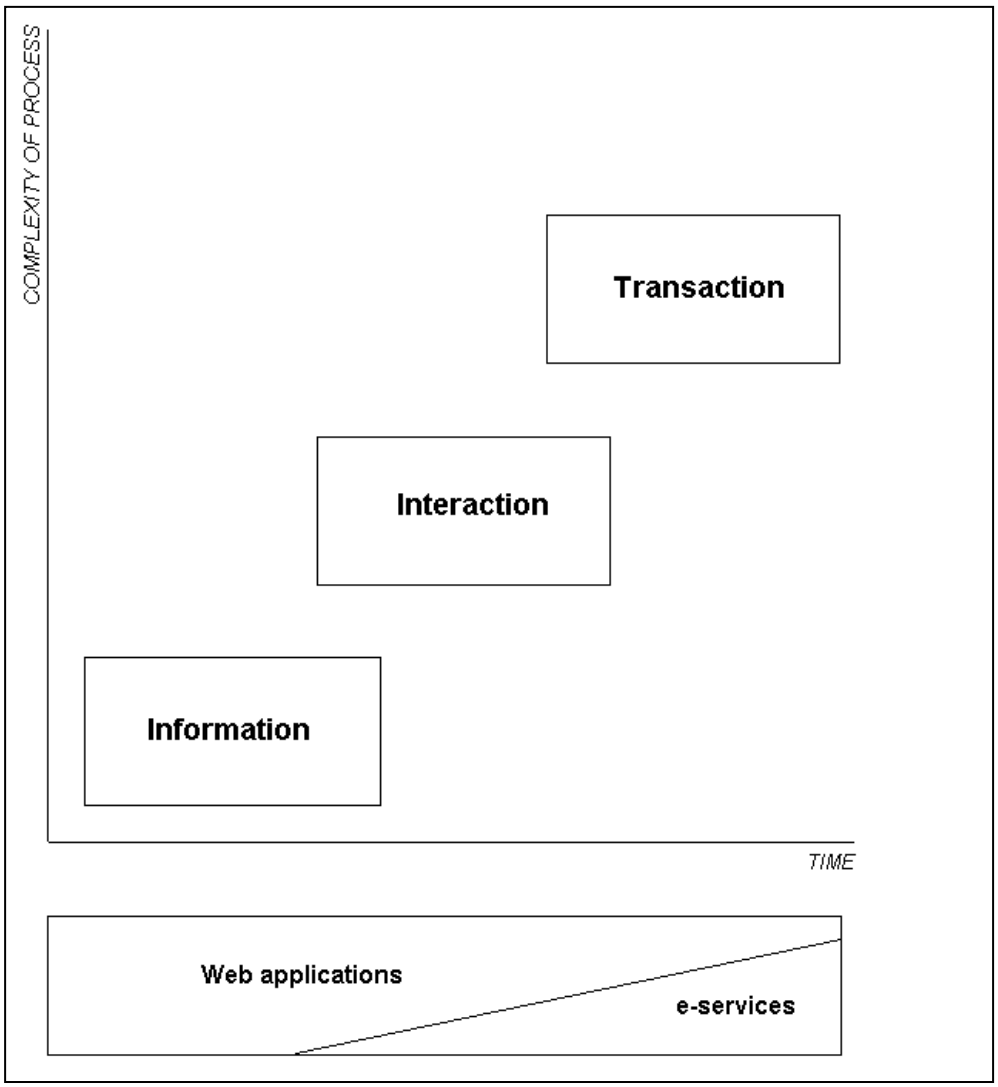
Scenario 2—Sharing Information within Government Institutions

This scenario describes a situation in which the GOL has become much more efficient in gathering and using information. A variety of business processes and computer applications are in use to enable better quality information to be collected more quickly and from more sources than are possible at the moment. This information is then made available to users inside the government more quickly and cost-effectively. The benefits will be significant reductions in data entry errors and operating costs.

A vital element of this scenario is the widespread use of a common set of standards for information exchange – an Information Interoperability Framework (IFF).

The applications that are implemented during this stage include knowledge management and management dashboard applications.

Figure 2. The e-Government Maturity Model



Scenario 3—Linking Business Processes Across Government Entities

This is the stage when government business processes are linked across institutional borders. In this environment Liberian citizens and businesses will no longer need to make repeated visits to different government Ministries in order to conduct business with the government. The result will be efficiency improvements and cost savings for the government and time saving for the users.

Because information is now being shared between different agencies, the common use of the Information Interoperability Framework is now critical. Significant changes to the culture of the relevant institutions will also now be needed to encourage the sharing of information and resources.

Intranets provide the platform to enable this process-linking and single points of contact (which will ultimately evolve into intranet Portals) are rolled out on the intranet towards the end of this stage.

Scenario 4—Sharing Services across Government

This scenario is of a situation in which the different GOL institutions share a set of common applications to undertake those business processes that are common to all.

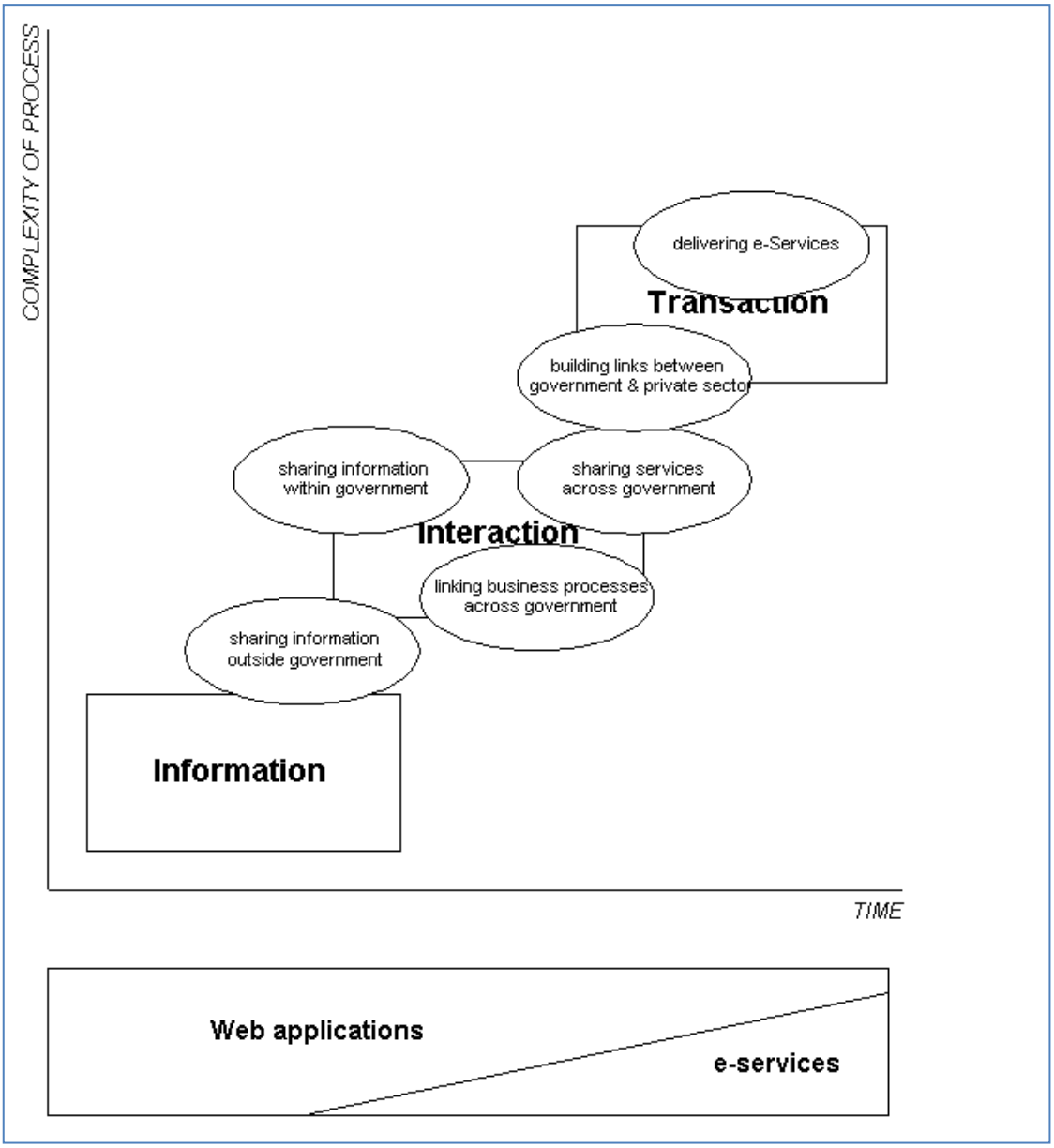
In the medium- to long-term it may be possible to build a business case to implement a standard ERP package for GOL. However this could only happen at a time when the difficulties currently exist in creating common business processes across GOL Ministries could be overcome. In the meantime it is more practical to envisage the delivery of a set of applications to provide common functionality such as payroll, accounting and Human Resource management across a single wide access network to the GoL ministries and agencies.

Scenario 5—Building Links Between Government & the Private Sector

This scenario is of a situation in which GOL and trusted partners from the private sector are able to share information in order to increase the efficiency of their interactions. Businesses will find it easier to identify those parts of government that they need to target in order to discover information and to identify opportunities for business. Government will find it easier to provide business opportunities to the private sector and will consequently benefit from the market-led and up-to-date skills that governments often lack. The benefits will include the encouragement of greater participation from the private sector, greater transparency in government interactions, and time saving for private sector companies.

Applications that will be implemented under this scenario include e-tendering, e-procurement, and e-auctions.

Figure 3. The e-Government Maturity Model and Scenarios for delivering e-Government



Scenario 6—Delivering e-Services

In this scenario e-services will be made available to citizens to allow them to undertake complex interactions with government. Some e-Services would be packaged (e.g.: an e-payment service) whilst others would be built at short notice from modular components. The e-services would interact with a government CRM (Customer Relationship Management) application that would provide detailed knowledge about the user and their preferences, on the basis of previous interactions, for the purpose of tailoring the service to the user‘s needs.

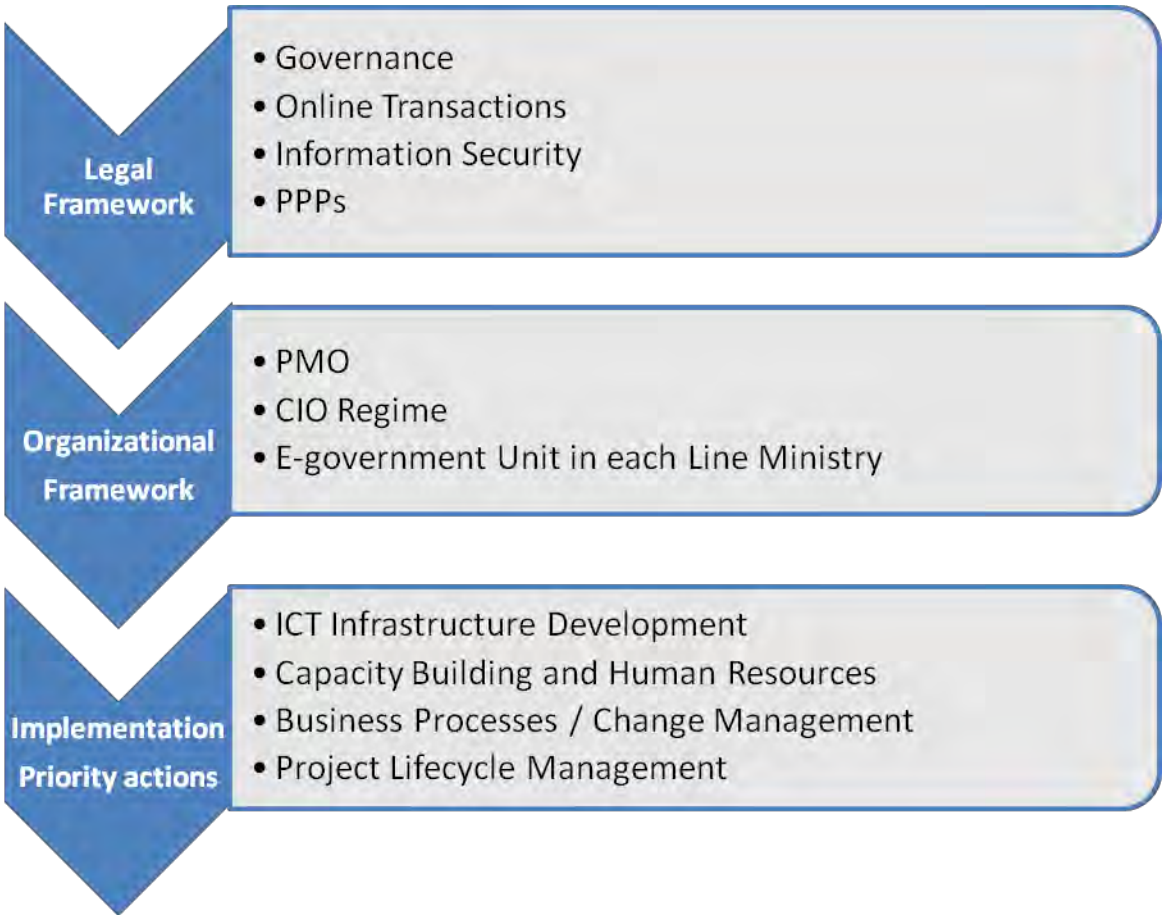
This environment will be enabled by the evolution of simple Web applications into a library of common Web Services or APIs (Application Programming Interfaces) that would be chained together to create the e-services.

4.4. E-GOVERNMENT IMPLANTATION PLAN

In order to implement E-government in Liberia, Three main Pillars have to be implemented:

1. Establish regulatory and Legal Framework - Legal Pillar
2. Establish E-government organization Framework – Organization Pillar
3. Implement E-government in line ministries and agencies. – Implementation Pillar

Figure 4. Main Pillars for implementing E-Government



4.4.1. Establishing Regulatory and Legal Framework:

A legal framework sets the basic rules and authority needed to implement e-Government. It is important, however, that laws are not only pieces of paper; they must be understood by all stakeholders, implemented and enforced.

Development of an effective legal framework for e-Government also requires close coordination and communication among entities in the drafting and enforcement of laws and regulations. The legal drafting process must involve all relevant stakeholders—including relevant ministries and the e-government Program—in order to produce regulations that are well understood and widely implemented.

Revisiting and enhancing existing Bylaws to support smooth automation of business processes also requires similar coordination among all relevant stakeholders in order to produce expected benefits and to ensure that amendments are well understood.

Roles and Responsibilities:

E-Government Project Management Office (PMO):

- Assist in the drafting of laws and regulations related to e-Government, as needed, including provision of legal expertise and training on e-Government matters.
- Help entities identify priorities in which laws and regulations require drafting or revision in order to effectively implement e-Government in Liberia.

Ministries/Political stakeholders:

- Enforcement of laws and regulations by appropriate entities, including the Ministry of Justice, Ministry of State, Ministry of Finance, Central Bank and others.
- Direct involvement of Legislator to expedite approval cycle for required laws and regulations
- Coordination with MoPT and e-Government Program Office on a timely basis about drafting and revision of laws and regulations related to e-Government.

4.4.2. Establishing E-government Organization Framework:

Liberia's long-term success in e-Government will require continued evolution of institutions that will be accountable for its e-Government policies and initiatives. E-Government requires robust institutional mechanisms. They are an absolute necessity to manage the complex mix of technologies, information, business processes and projects involved in E-government.

To achieve this target, the following organizational units are required to be established and empowered by the GoL:

1. Establishing a National ICT Governing Board to oversee e-Government development in the country.
2. Establish Project Management Office sitting MoPT, to supervise the implementation process.
3. Establishing standardized e-Government Units within each ministry, headed by the CIO of the ministry.
4. Establishing, as needed, inter-agency working groups to coordinate key cross-governmental E-government policies and initiatives.

4.4.2.1. National ICT Governing Board:

Establishment of an ICT Governing Board is a crucial step toward strengthening the institutional framework for e-Government in Liberia. E-Government requires both a high level political ownership and a steering committee to provide strategic leadership and set direction. This is necessary for policymaking and public sector commitment to e-Government. Also, e-Government direction and priorities need to be set at national level so as to ensure consistency.

4.4.2.2. Project Management Office:

A Program Management Office is an entity that provides a structure to act as a co-coordinator of a program of projects; as a creator and watchdog of standards; as a supplier of information to Steering Committees and Change Management Boards. To give an example;

Each project would have a Business and Benefits case; the job of the PMO is NOT to specifically write the Business Case, but to evaluate and validate it based upon the parameters set by the CIO, CTO or CFO etc…. This might be the number of resources available; the total program budget or any other previously agreed criteria used to measure the TOTAL benefit to, say, MoPT.

Another responsibility it would have is to monitor the agreed business case to ensure that the statements being made are realized. Obviously every function in a PMO can be re-structured to fit the organization, to continue the business case example; Management may want PMO staff to act as mentors to Project Officers who have previously never written a business case.

The PMO will only have authority over projects in respect of the application of program and project management methods, procedures and support tools. The Change Management Board via the Senior Responsible Owners and Program/Project Boards will provide direction of the Projects for each sub-program and their associated projects.

However the functions are allocated; it is important to remember that the PMO must have an independence from individual projects and that its' decisions should be based upon the wider picture of the total program.

The ICT4D Steering committee (which should be later promoted to the national ICT governing board) is the driving force behind the PMO. The make-up is dependent on the power that the PMO is intended to have. It would include the PMO Director and ideally include at least one e-Gov Minister.

Goals and Objectives

The goal of the e-Gov Program Management Office is to improve the business performance of E-government initiatives by improving the project delivery effectiveness of project teams.

The e-Gov Program Management Office (PMO) will:

- Monitor project progress and produce performance analyses to provide leadership with significant insight into the state of all projects
- Ensure the usage of standard project management processes
- Implement and maintain project office standards, tools, and processes
- Establish risk assessment guidelines
- Enable the sharing of knowledge and best practices amongst project managers
- Maintain existing and develop new relationships, both inside and outside of the e-Gov initiatives, that will reinforce the ability of the PMO to deliver _business value'
- Act as the single point of contact for requests of project teams to provide information to other Government entities.
- Maintain the efficiency of the PMO.

PMO Structure, functional requirements and challenges are explained in detail in Annex 6

4.4.2.3. Chief Information Officer :

Government of Liberia (GOL) intends that the CIO will lead the national unit to implement e-Government, among other things. It should be emphasized that the actual role of the CIO for the GOL will need to be determined through the ICT4D Steering Committee (ICT4D SC). One of the first things to be done after potential CIOs are nominated from the respective line ministries is to define and establish a CIO Council (CIOC) with a representative from all ministries (or designated ones) and assign a leader for the CIO Council with the understanding that the CIO Council is responsible for leading and managing the Government of Liberia‘s implementation of national ICT Policy, and using ICT effectively and efficiently to help the Government achieve its Poverty Reduction Strategy (PRS) and beyond.

One of the most important functions of the CIO and the CIO Council is to help the GOL to utilize ICT to transform government processes – what the possibilities are – and figure out what changes should come first. This will also include guiding ministries in the difficult effort to change how they conduct the government‘s business. From a strategic planning perspective, some of the biggest challenges faced by the CIO can be summarized below

- Spending the scarce GOL resources available for ICT.
- Ensuring that security, confidentiality and risks are well assessed and adopted rules are enforced.
- Managing the procurement processes related to ICT to not fall behind technologically because of a slow process; not stifle innovation; and how to use it to help strengthen Liberia‘s small but growing ICT sector.
- Establishing a transparent governance process related to the use of ICT that will balance decentralized actions with the need to manage standards and rules in a centralized manner.
- Utilizing ICT to strengthen transparency; improve citizen participation in government and support the growth of Liberia‘s businesses – instilling a strong focus on customer satisfaction whoever the customer is (e.g., an internal government unit, a citizen, a business).
- Setting performance measures to enable the government – and citizens – to monitor how well the GOL is doing in using ICT well to achieve its Poverty Reduction Strategy.
- Building the capacity of the government‘s employees to use ICT properly and provide them adequate compensation and incentives to apply their new skills and experience to government.
- Setting standards for computer hardware and software within government, for example what operating system(s) are permitted, which type of version of office tools may be used and will be supported.
- Determining what type(s) of network equipment will be permitted.
- Providing adequately protected Internet and email access to government offices and employees as well as an intra-government network (probably a virtual private network) for all ministries to use.
- Creating an efficient and cost effective intra-government communications and information sharing system (ICT-enabled tools to sharing, collaborating on and storing documents and electronic transactions.
- Setting and ensuring compliance with basic computer security procedures (to prevent computer viruses hampering the use of ICT by the government);

- Defining a government enterprise architecture across ministries that includes defining where software applications need to be integrated or have interfaces; which software applications will be shared across the government (e.g., those related to human resources and payroll); which ministries are responsible for which data bases; and how databases will be defined (e.g., to ensure that individuals and businesses are consistently identified across ministries).

4.4.2.4. The CIO Council

The basic work of the ICT4D Steering Committee to be done first is the establishment of a CIO Council with representatives from each ministry (or almost all ministries), and define the Council's responsibilities and governance structure. Experience shows the importance of having a central advisory group to be a resource for helping to promote the efficient and effective use of ICT resources in Government. The Council serves as the principle forum for Government CIOs to:

- Develop recommendations for Government-wide information technology management policies, procedures, and standards;
- Share experiences, ideas, and promising practices for improving information technology management and promote cooperation in using information resources;
- Address the Government's hiring and professional development needs for information management, and make recommendations and provide advice to other agencies on the Government-wide strategic plan.

4.4.2.5. Ministries E-Government Unit

Establishment of a standardized organizational structure for e-Government within every ministry as part of the Performance Development and Monitoring Unit will be a valuable addition to the institutional framework. If each ministry has a similar e-Government institutional structure, this will facilitate proper coordination among entities.

Each ministry and agency will be expected to establish an e-Government Unit that will include:

- Chief Information Officer (CIO);
- Information Security Officer;
- E-Government Project Manager;
- Change Officer;
- Content Manager; and
- Customer Relationship Officer

4.4.2.6. Inter-Agency Working Groups:

It is expected (and essential) that functional, inter-agency working groups will be established at different levels of government to formulate strategies and coordinate work on national policies, cross-agency initiatives and individual projects. At the project level, the e-Government Program already uses such working groups.

For certain key national initiatives—such as information security—the need for their establishment at different levels of government must be identified. Another such needed working group is the national Legal Committee to help identify and prioritize laws required for e-Government execution, as well as draft and enforce legal standards, laws and regulations. Formation of this body will be crucial to efficiently drive and coordinate the required legal efforts.

Other working groups will form as needs arise. For example, as the use of public-private partnerships (PPPs) increases in Liberia, as it has for e-Government efforts in other countries, the need for a national PPP unit may emerge.

4.4.3. Implementation of E-government Projects:

The National ICT Governing board should be responsible for developing the required policies, funding the necessary projects and providing the required experts to conduct each of the following activities:

- ICT Infrastructure Development
- Capacity Building and Human Resources
- Business Processes / Change Management
- Project Lifecycle Management

The implementation of E-Government projects will be a continuous process for the next 10 years in Liberia; hence it requires commitment and long term and sustainable implementations plans.

4.5. PRIORITY ACTIONS

Infrastructure Priorities:

1. Establish well designed networks inside the ministries of GoL.
2. Create and prepare efficient ICT human capacity, through implementing training programs and hiring the missing expertise required in each ministry. (Please refer to section 6.1 for detailed information about hiring needs).
3. Support Liberia Fiber optic network ring initiated by Libtelco, and ensure that most of the ministries if not all are connected to this network.

Organizational Priorities:

1. Establish the CIO Position in CSA, for all ministries and agencies of GOL.
2. Hire CIOs in Line ministries, and conduct CIO Training (Please refer to section 7.1)
3. Establish Project Management Office in MoPT, empower it with enough experts.
4. Establish E-Government unit in the following ministries as a pilot organizational body (MoF, MOH, MOE, MOA, MPEA, CSA and MOJ) and initiate working on the legal framework for E-government.
5. Create e-government unit for the rest of the line ministries, benefiting from the experience taken in creating the organizational body mentioned above.

Public awareness and change Priorities:

1. Encourage all line ministries to take serious steps to have web presence, starting by creating a professional website and walking it through the development scenarios mentioned in section 4.2
2. Provide incentives for private sector to interact with the government entities via internet and websites (ex: Publishing tenders and RFPs, Publishing periodic journals for business and government notices).
3. Encourage Private sector and specially telecom operators to create useful web content and encourage using internet as a services channel, to increase the ability of the citizens to use internet as a medium to acquire services.

5. EXISTING PHYSICAL CONNECTIVITY AND CURRENT PLANS

Liberia is in a real need of connectivity to the external world, to enable Liberians and GoL to access information and resources on the internet with an affordable and efficient cost and speed.

GoL is totally depending on VSAT connectivity which consume the largest portion of the budgets allocated to develop the ICT in line ministries and agencies, in addition to Service providers who charge very high rates and provide very low bandwidth capacity due to their high operational costs.

Liberia is considered as isolated from the international Internet cloud with no outgoing fiber connectivity and therefore satellite communication is required for all international networking.

This, coupled with a lack of a national network backbone, has created a difficult environment for expanding the availability and use of the Internet. Moreover, there is no major international gateway provider, which forces individual providers to implement their own international gateway facilities. This constraint limits the sector‘s growth, increases prices, and ultimately reduces the available capacity.

Currently, Liberia has four Mobile Operators and one national operator who operate both fixed and mobile phone services. Internet access through Mobiles, Internet Cafés and IT Training centers are growing in Monrovia the capital, giving more opportunities for youth to access the internet, despite of the slow and low quality connection, however Internet access in the counties does not almost exist.

Realizing the importance of ICT in the development of the country‘s economy and education, the government has given special focus on building the ICT infrastructure in Liberia, through a series of steps:

1. Issuing the Telecommunication Act of 2007
2. Formulation of a national ICT Policy, that represents a five year action plan for the ICT Sector to develop.
3. In June 2010, Liberia signed for a share in the submarine cable connecting Europe to the West African cost, with a connectivity share of 6 GB bandwidth, to be operated in first half of 2012.
4. Plans to build a fiber optic network in Monrovia, connecting most of the government ministries and agencies, and creating the opportunity to develop a national connectivity backbone.

5.1. CURRENT EXISTING CONNECTIVITY

There is no current existing networking between any of the ministries and agencies of the GoL.

Almost all the ministries has no connection between its head office and other county offices, who lakes the availability of internet connection, and sometime cell connectivity.

Head office		External offices			
Acronym	Has Internet	No. of External Offices	Has Computers	Connected to HQ	Has Internet Access
MoF	Yes	15 County Office	No	No	No
MoE	Yes	15 County Office	No	No	No
MoPW	Yes	15 County Office	Yes, all	No	yes
MoL	Yes	15 County Office	4 out of 15	No	No
MoC	Yes	15 County Office	No	No	No
MoT	no	None	NA	NA	NA
MoPT	yes	15 County Office	No	NA	NA
MoND	Yes	None	NA	NA	NA
MoJ	Yes	15 County Office + 4 regional	4 out of 19	No	No
CBL	Yes	None	NA	NA	NA
GSA	Yes	None	NA	NA	NA
CSA	no	1 Office in Monrovia	Yes	No	No
GAC	YEs	None	NA	NA	NA
LTA	Yes	None	NA	NA	NA
MoIA	Yes	15 County Office	No	NA	NA
MoH	Yes	15 County Office	Yes, All	No	Yes
MPEA	Yes	None	NA	NA	NA
MoA	Yes	3 Regional offices	No	No	No
MLME	Yes	18 Offices in Monrovia and counties	Few	No	No
MICT	Yes	3 Regional offices	No	No	No
MoS	Yes	3 Regional offices	Yes	No	No
MoFA	Yes	None	NA	NA	NA
UL	None	10 buildings the same campas	No	None	No
LISGIS	Yes	15 County Office	No	Yes	Yes
LTC	Yes	3 Regional offices	Yes	Yes-VPN	Yes
FDA	Yes	4 Regional offices	Yes	No	No
NEC	Yes	19 Offices in Monrovia and counties	Yes	None	None
PPCC	Yes	All Procurement departments GoL	Yes	no	no
LPRC	Yes	None	NA	NA	NA
NPA	Yes	3 Regional offices (Ports)	Yes	no	no

5.2. MONROVIA FIBER OPTIC RING – PHASE 1

Libtelco acting as the national operator, and the owner of the ducts system, has initiated the building of a fiber optic network Ring in inner Monrovia, aiming to connect most of the ministries and agencies with Fiber cables. This cost of connecting a single node will cost approx. 55000 USD, which cannot be easily afforded by most of ministries and agencies.

The first phase is to include 9 nodes, 3 of them are used to connect Libtelco buildings while the other 6 are supposed to connect the following ministries:

- Ministry of Finance
- Central Bank of Liberia
- University of Liberia
- Ministry of Foreign affairs
- Civil service agency (CSA)
- National Port authority and Free Port (NPA)

During the development of this report, this plans has changed to include more ministries in the first phase, however such information was not disclosed by Libtelco or MOF.

6. ORGANIZATION STRUCTURE OF GOL AND HUMAN CAPACITY PLANNING

6.1. ICT HUMAN CAPACITY BUILDING

6.1.1. General Guide lines

6.1.1.1. For each Ministry or agency, the IT department should recruit and train its staff based on the following guidelines:

1. Planning and evaluation - 1 person per department – usually the IT Director.
2. Database Administrator – at least one per department
3. Network administration and Security – Min. 1 person for each 40 computers
4. Technical Support, Software installation and update – Min. 1 technician for each 25 computers
5. Network Technicians and hardware repair – at least 1 per each 40 computer.
6. Training - Optional depending on the ministry needs, (recommended at least 1 per department)

6.1.2. Qualifications and Training Guidelines:

6.1.2.1. Network administrators and Security administrators:

1. MCSE Certificate or equivalent. (Recommended MCSE for Standardization with other GoL Ministries)
2. Trouble shooting and problem solving Training

6.1.2.2. Technical Support and SW Installations:

1. Trouble shooting.
2. ICDL Certificate – (International Computer Driving License)
3. General Software Installation and update training
4. Team Building and training skills – (How to transfer knowledge to users, and educate users on best practices)

6.1.2.3. Network Technicians and hardware repair:

1. A+ certificate (Maintenance and Hardware repair certification)
2. Computer Safe repair best practices

6.1.2.4. Database administrators:

1. MSSQL Server Professional Certificate – MCP (SQL Server 2005 or 2008)
2. MSSQL Server administration certificate – SQL DBA
3. Windows server 2003 / 2008 administration experience or training.

6.1.2.5. Planning:

1. Communication skills and Team Management training
2. CIO Training
    a. CIO Leadership and Decision Making
    b. IT Governance
    c. Developing and Implementing IT Strategy and Planning
    d. IT Capital Planning
    e. IT Project Management
    f. Developing Enterprise Architecture
    g. Understanding E-Gov
    h. e-Gov Workshop

6.1.2.6. Training:

1. High communication skills
2. Team management Training
3. Technical writing and Training management Training
4. ICDL certificate

6.1.3. Recruitment requirements:

The following is a listing of the current available skills in GoL, and the additional skill required to build a strong IT Department, the required capacity is estimated based on the standard guidelines mentioned earlier in this section.

		AVAILABLE CAPACITY							REQUIRED ADDITIONAL CAPACITY					
Agency	No of Employees	No of Workstations	DBA	Tech. Support	HW Repair	N/W Admin	Training	Planning	DBA	Tech. Support	HW Repair	N/W Security & Admin	Training	Planning
MoF	12	350	1	4	3	2	0	2	1	3	1	3	4	0
MoE	6	110	0	6	2	4	3	1	1	0	0	0	0	0
MoPW	6	150	1	2	2	2	3	0	0	3	1	1	1	1
MoL	10	88	0	2	1	1	2	0	1	2	1	0	0	1
MoC	5	70	0	2	0	0	3	0	1	1	1	1	0	1
MoT	1	56	0	1	0	0	0	0	1	1	1	1	1	1
MoPT	0	<10	0	0	0	0	0	6	1	1	0	0	1	0
MoND	2	100	0	2	1	1	0	2	1	2	1	1	3	0
MoJ	2	90	0	2	0	0	0	0	1	2	2	1	2	1
CBL	9	150	3	3	4	4	1	1	0	1	0	0	2	0
GSA	14	18	0	4	1	4	4	1	1	0	0	0	0	0
CSA	4	1	1	0	1	0	0	1	0	1	0	1	3	0
GAC	12	200	0	3	0	2	3	1	1	3	1	0	2	0
LTA	1	19	0	1	0	1	0	1	1	1	1	0	0	0
MoIA	2	40	0	2	2	2	2	1	1	0	0	0	0	0
MoH	6	243	0	3	2	3	2	2	1	3	3	1	3	0
MPEA	3		0	3	1	3	2	1	1	0		0	0	0

		AVAILABLE CAPACITY							REQUIRED ADDITIONAL CAPACITY					
Agency	No of Employees	No of Workstations	DBA	Tech. Support	HW Repair	N/W Admin	Training	Planning	DBA	Tech. Support	HW Repair	N/W Security & Admin	Training	Planning
MoA	4	125	0	3	3	3	0	1	1	2	0	0	2	0
MLME	1	28	0	1	0	1	0	0	1	0	0	0	0	1
MICT	1	50	0	1	0	0	0	0	1	1	1	1	1	1
MoS	4	75	0	2	2	2	0	1	1	1	0	0	2	0
MoFA	5	50	0	3	0	1	0	0	1	0	1	0	1	1
UL	11	18	1	4	0	2	3	0	0	0	0	0	0	1
LISGIS	7	100	0	4	2	2	0	2	1	0	0	0	3	0
LTC	7	<20	0	7	0	0	0	1	1	2	0	1	1	0
FDA	4	63	0	2	1	1	0	0	1	1	1	0	2	1
NEC	7	33	2	4	1	4	0	3	0	1	0	0	0	0
PPCC	1	18	0	1	0	1	0	0	1	0	0	0	0	1
LPRC	7	140	2	2	1	1	0	1	0	3	2	1	3	0
NPA	4	60	0	3	0	1	0	0	1	0	1	0	2	1

6.1.4. Priority of recruitments:

1. Network administrators and networks implementation technicians. (1:6 month hiring)
   - Prepare the infrastructure, and establish the basic needs for the ICT usage.
   - Prepare inventory, records hardware allocation and user identification.
2. Trainers and technical support:
   - Educate users
   - Conduct workshops and training programs to employees in their respective ministries.
   - Establish Best Practices awareness, security and virus protection.

6.2. POSSIBLE CANDIDATES FOR CIO POSITION IN GOL

	Acronym	Position	Name	Contact Number	Email
1	MoF	Director of IT	Anthony McCritty	06 538023	tony@mccritty.com
2	CBL	Director of IT	Mohammed B. Varney	05 614537	mbvarney@cbl.org.lr
3	CSA	Director of IT	Shady abdel Baky	6633706	sbaky@yahoo.com
4	MoIA	Director of IT	Taiyee Quenneh	06 857487	tquenneh@yahoo.com
5	MoA	Director of IT	Daniel Browne	077 891086	dbrowne414@yahoo.com
6	MoS	Director of IT	Philajua Boima	077 822090	pboima@emansion.gov.lr
7	LISGIS	Assistant Director of IT	Joseph Kamara	06 526043	Jckamara@yahoo.com
8	LTC	Director of IT	Augustus T. Payne	25557350	apayne@libtelco.com.lr
9	NEC	Director of IT	James Dogbey, Sr.	06 284302	jdogbey@necliberia.org
10	LPRC	Director of IT	Momolu Dukuly	06 610412	jmdukuly@lprclib.com

The Nomination of these candidates is based on:

1. Personal Interviews.
2. Communication Skills.
3. Commitment in sending required information on time.
4. Their ability to plan for the IT Department in their respective ministries/agencies.
5. The progress done during their work in their current position.

7. SUMMARY OF RECOMMENDATIONS

7.1. CAPACITY BUILDING AND TRAINING CURRENT GOL TECHNICAL STAFF

a. Implement national ICT training program for IT department employees in GOL
    i. Maintenance and repair training
    ii. Network administration and security
    iii. Software installation and trouble shooting
    iv. Knowledge transfer and soft skills

b. Hiring new calibers
    i. Recruit required capacity for filling the gaps in the organizational structure of the IT Department in each ministry.
    ii. Implement training programs for the missing skills inside the ministry.

c. Initiate Developing ICT education to meet long term objectives of capacity building
    i. New courses in University
    ii. Enhance computer labs
    iii. Provide internet service with special rates for students.
    iv. Provide computer references and books, or provide books with low cost for students

7.2. ORGANIZATIONAL STRUCTURE

a. Recommended IT Department structure

    Each IT Department in GoL ministries and agencies should follow the following guidelines in reforming its organizational structure.

    i. The department must have at least one skilled person in each of the following fields:
        1. Network construction and maintenance
        2. Network administration and security
        3. Trouble shooting and helpdesk support
        4. Database administration and development
        5. Training
        6. Planning and budgeting.
    ii. Each ministry should conduct a 3 months performance evaluation and audit on the performance of IT Department, end user satisfaction and progress in the knowledge of end users.
        1. End users must have better skills in best practices in each evaluation (this evaluate the training program as well)
        2. Computer misuse incidents must be recorded and monitored.

iii. Recruitment priorities should be based on the guidelines in section 6.1 of this report.

b. MoPT – CIOs and PMO

i. MoPT needs to take all required actions to effectively install CIO Regime:

1. Prepare and approve ToR for CIO by the ICT4D Steering Committee
2. Apply for adding the CIO position in CSA and get CSA approval on ToR
3. Hire CIOs in line ministries
4. Conduct CIO Training for all CIOs.

ii. A CIOs training programs is required to all nominated CIOs, it is very important that they all attend the training together, and to conduct multiple workshops to enhance teamwork and coordination skills.

iii. Project Management Office is required to be formally established and designated as the monitor and reference point for all e-government projects.

iv. MoPT is required to draft the required Laws and Acts, empowering PMO to fulfill its duties and functions.

7.3. CONNECTIVITY AND INFRASTRUCTURE

a. GOL Ministries Internal Connectivity

v. GOL Ministries need to implement a secured domain control network, adding firewalls and anti viruses to ensure security.

vi. A secured server room must be created, authorized entrance should not exceed three persons, and Entrance logs or registers must be kept and audited periodically.

vii. Ideally, a backup server is required to reduce risks of loosing information saved and to act as primary server in case of failures.

b. Ministries external connectivity

viii. It‘s highly recommended that all the ministries connect to the fiber optic ring currently being established by Libtelco.

ix. GoL need to ensure that the optimum topology for connecting all ministries with the least possible cost (sharing connection points to the fiber network between ministries geographically close in distance through a LAN or Wireless)

7.4. SOFTWARE STANDARDIZATION AND OPERATING SYSTEM PLATFORMS

a. Operating systems standardization

Windows operating systems is recommended for all workstations

- Servers: Windows server 2008
- Workstations: windows XP Pro, windows 7 Pro.

b. Database Management Systems Standardization

- Microsoft SQL Server 2005 is recommended for general purpose application.
- For special purpose applications, Oracle DB or other DMBS systems can be used, provided that they can interface with other systems as required.

c. Business applications interface standards

- All applications must be following the technical interoperability standards, please refer to Annex 4 for more details.
- Enterprise Resource Planning Systems (ERP) should be considered in each ministry when implementing e-government applications in the line ministries.

ANNEX 1: LIST OF CONTACT INFORMATION AND KEY PERSONS IN ALL MINISTRIES AND AGENCIES

#	Ministry/Agency	Name	Position	Phone	Email
1	Central Bank of Liberia	Mohammed B. Varney	IT Director	05 614537	mbvarney@cbl.org.lr
2	Central Bank of Liberia	Mussah A, Kamara	Director of supervision department	2316556033	kamaramusa@yahoo.com
3	Civil Service Agency	Shady abdel Baky	IT Director	6633706	sbaky@yahoo.com
4	Forestry Development Authority (FDA)	Morris Stewart	IT Director	077 713477	morriskstewart44@yahoo.com
5	General Auditing Commission (GAC)	William Harris	Assitant IT Director	06 931010	wsharrisjr@gacliberia.com
6	General Services Agency (GSA)	John R. Tuah, Jr.	IT Director	06 901330 077 738222	john.tuah@gsa.gov.lr
7	Liberia Telecommunications Authority (LTA)	Samuel Coleman	IT Director	06 284302	samcoleman@yahoo.com
8	Libtelco	Augustus T. Payne	IT Director	25557350	apayne@libtelco.com.lr
9	Libtelco	Ben Wolo	Managing Director	231025551001	bwolo@libtelco.com.lr
10	LISGIS	Joseph Kamara	IT Director	06 526043	Jckamara@yahoo.com
11	LISGIS	ounzumba Kermej - Gama	National Data Specialist	2316787250	okemeh@gmail.com
12	Lonestar - MTN	Nathaniel E. Kevin	Regulatory consultant	2316500000	nkelvin@lonestarcell.com
13	LPRC	Momolu Dukuly	IT Director	06 610412	jmdukuly@lprclib.com
14	Minister of Finance	Herbert Soper	EDP Manager	06839733	herbertsoper@yahoo.co.uk

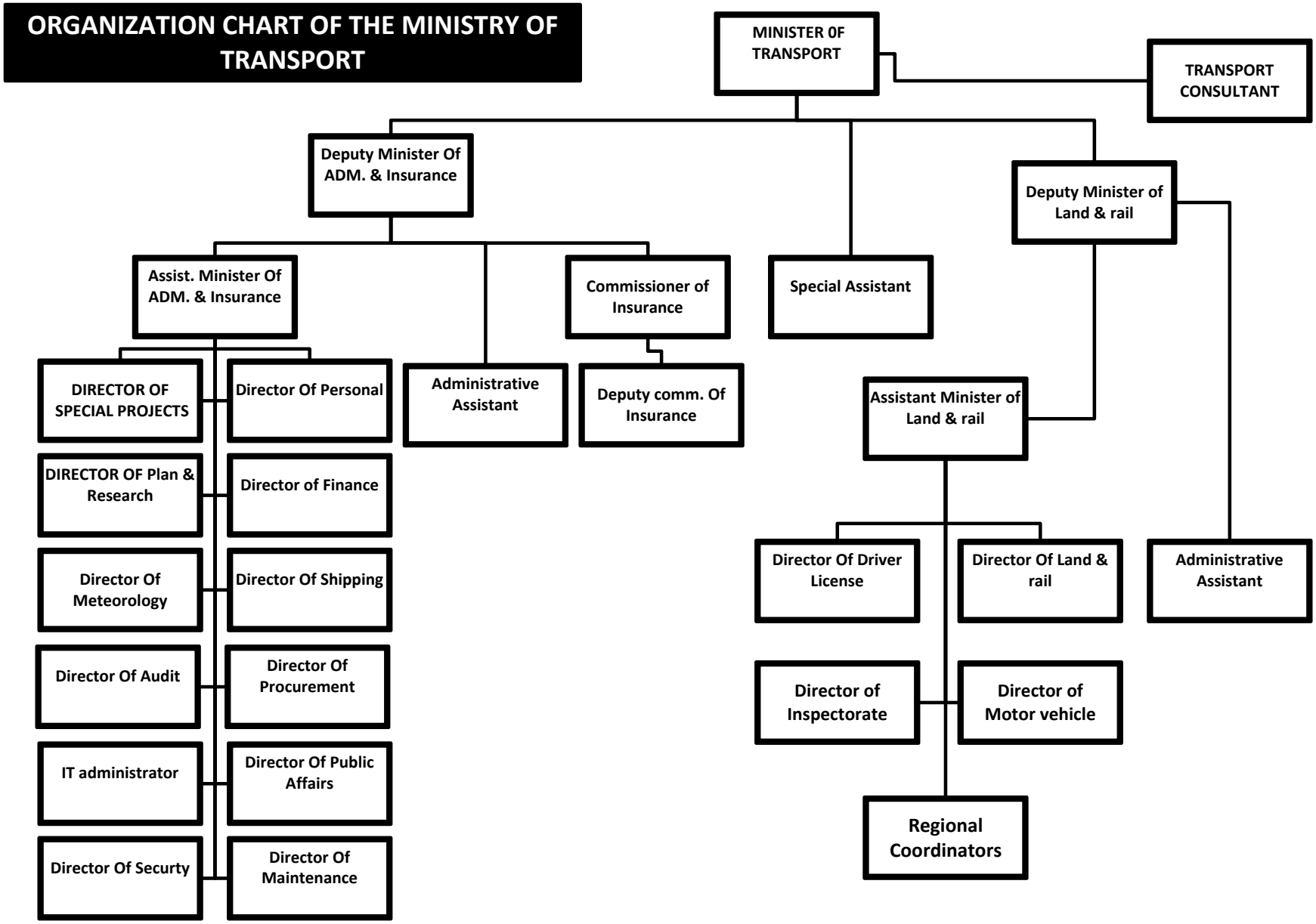
#	Ministry/Agency	Name	Position	Phone	Email
15	Ministery of Planning and economic affairs	James Dorbor Jallah	Deputy Minister for sectoral and Regional Planning	231027212002	djallah@mopea.gov.lr
16	Ministry of Agriculture	Daniel Browne	IT Director	077 891086	dbrowne414@yahoo.com
17	Ministry of Commerce	Jekins Dortu	Assitant IT Director	06 551575	jdortu2006@hotmail.com
18	Ministry of Defence	Jorge Tokay	IT Director	06 545206	mod-tokay@yahoo.com
19	Ministry of Education	Siaffa Bottomley	IT Director	06 462745 076 462745	siajese@yahoo.com
20	Ministry of Education	Carlton Aslett	Team leader- Public financials expert	2315500012	carltonas@gmail.com
21	Ministry of Education	Christine C,. Sirleaf (Ms)	assistabt directress - procurment division	2316452708	ma-hawah2007@yahoo.com
22	Ministry of Finance	Anthony McCritty	Data Center Manager - IFMIS	06 543754 06 538023	kkarikolraj@ibi-usa.com
23	Ministry of Foreign Affairs	Mulbah Stewart	IT Director	06 540595	jsmulbah2007@yahoo.com
24	Ministry of Health	Beatrice Lah	IT Director	06 900052	beatrice_lah@moh.gov.lr beeatucc@yahoo.com
25	Ministry of Information, Culture & Tourism	Omaur Fofana	IT Director	06 582015	fofanaoumar@yahoo.com
26	Ministry of Internal Affairs	Taiyee Quenneh	IT Director	06 857487	tquenneh@yahoo.com
27	Ministry of Justice	Mustapha Gray	Assitant IT Director	06 553022	mustaajah@yahoo.com
28	Ministry of Labor	Mohammed Sowah	IT Director	06 511023	kadaone@yahoo.com msowa@mol.gov.lr
29	Ministry of Lands, Mines & Energy	Harris Johnson	IT Director	077 098441	wulujohnson@yahoo.com; hwjohnson2009@gmail.com
30	Ministry of Planning & Economic Affairs	Jackson Wondey	IT Director	06455404	Jackson.wnde@gmail.com

#	Ministry/Agency	Name	Position	Phone	Email
31	Ministry of Post & Telecommunications	Joe Bondo	IT Director	06 553427	NA
32	Ministry of Post & Telecommunications	Sekou M. Kromah	Deputy Minister of technical services	23106513065	smkromah@mopt.gov.lr
33	Ministry of Post & Telecommunications	Hon. Jeremiah C. Sulunteh	Minister	2316472976	minister@mopt.gov.lr
34	Ministry of Public Works	Jerome Beh	IT Director	06 558871	jbeh@mpw.gov.lr jbeh2001@yahoo.com
35	Ministry of State	Philajua Boima	IT Director	077 822090	pboima@emansion.gov.lr
36	Ministry of Transport	Trokon Richards	IT Director	05 874718	trojal_83@yahoo.com
37	National Elections Commission (NEC)	James Dogbey, Sr.	IT Director	06 550827/077 7027778	jdogbey@necliberia.org
38	National Port Authority (NPA)	Mulbah Gwesa	Network administrator	06 468727	NA
39	PPCC	Darius King	IT Director	06 565429	drkng@yahoo.com
40	University of Liberia	Robert K. Damalo	IT Director	06 596104	robertkdamalo@yahoo.com rdamalo@ul.edu.lu

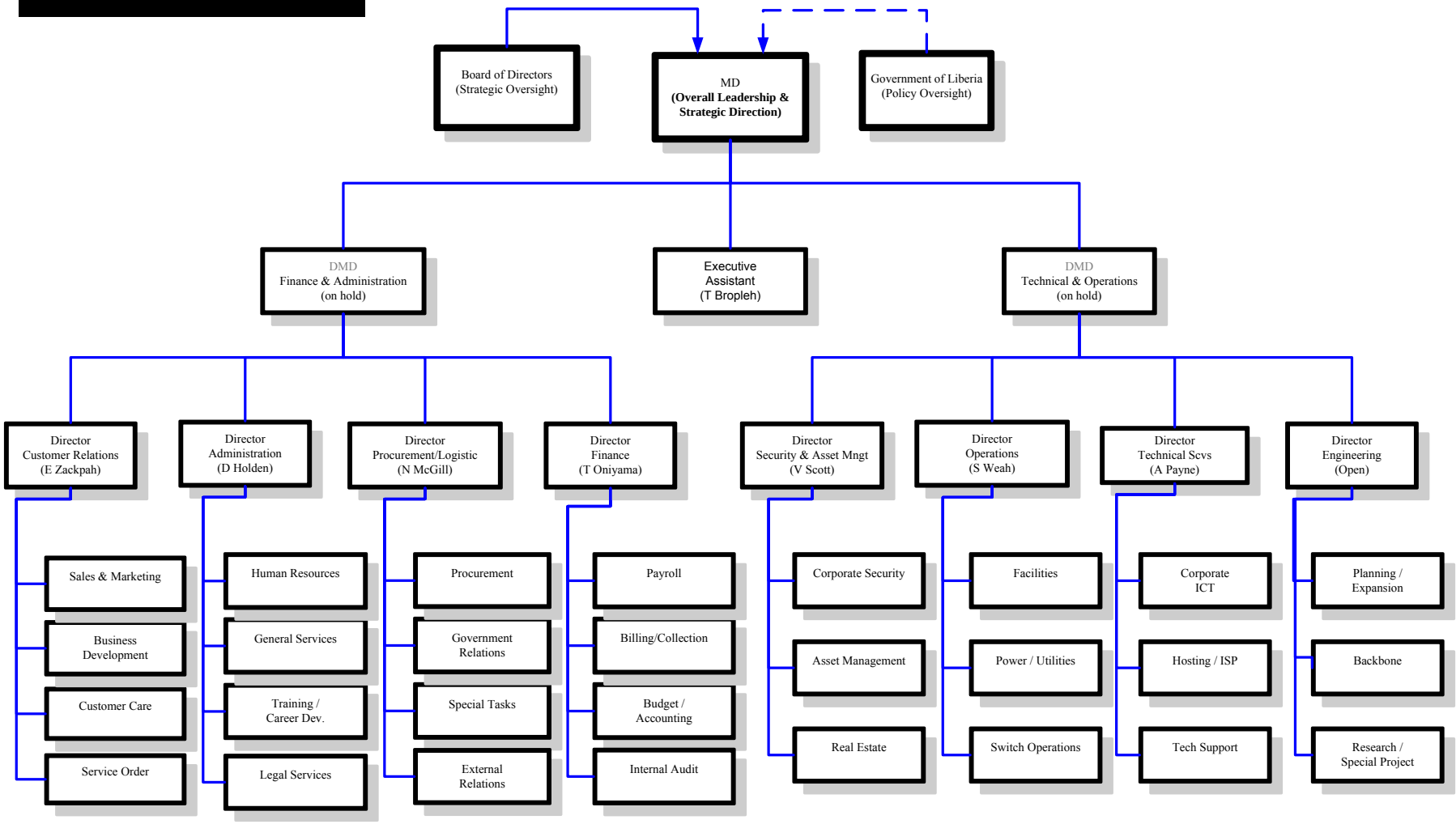
ANNEX 2: ORGANIZATIONAL CHARTS OF LINE MINISTRIES AND AGENCIES

Note: only 12 ministries and agencies have delivered a complete Organization Chart at the time of this report.

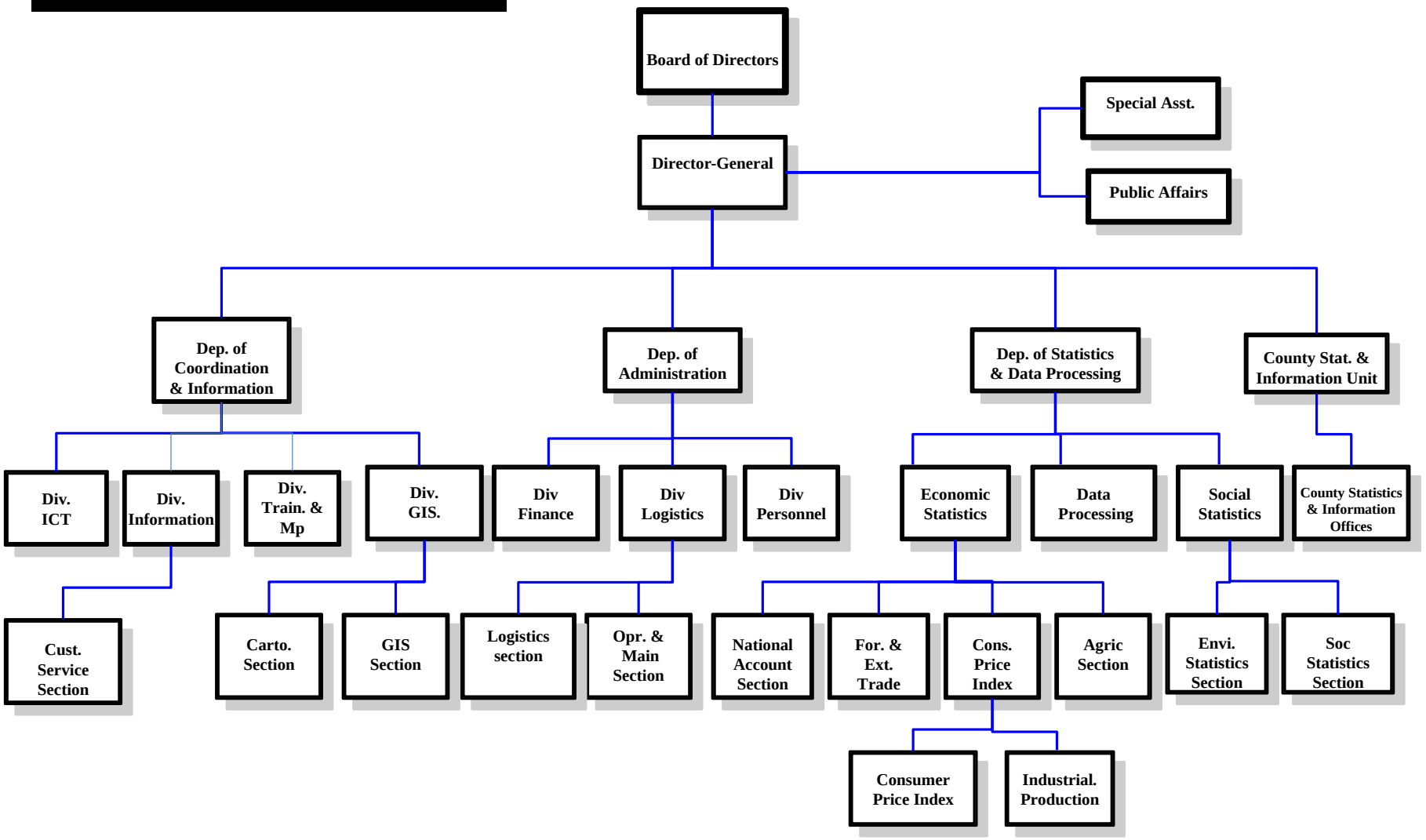
ORGANIZATION CHART OF THE MINISTRY OF TRANSPORT



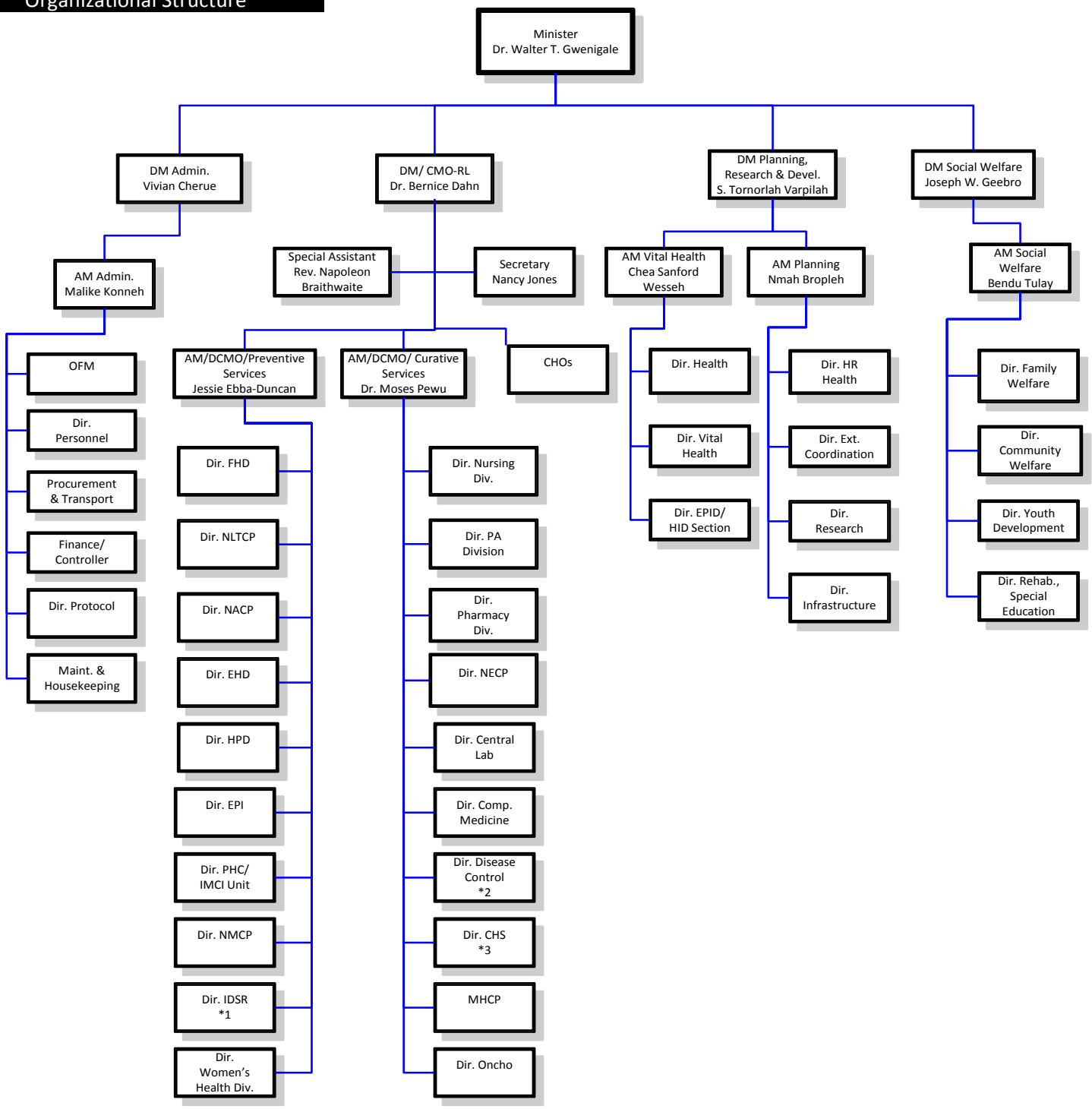
Libtelco


Board of Directors
(Strategic Oversight)
MD
(Overall Leadership &
Strategic Direction)
Government of Liberia
(Policy Oversight)
DMD
Finance & Administration
(on hold)
Executive
Assistant
(T Bropleh)
DMD
Technical & Operations
(on hold)
Director
Customer Relations
(E Zackpah)
Director
Administration
(D Holden)
Director
Procurement/Logistic
(N McGill)
Director
Finance
(T Oniyama)
Director
Security & Asset Mngt
(V Scott)
Director
Operations
(S Weah)
Director
Technical Scvs
(A Payne)
Director
Engineering
(Open)
Sales & Marketing
Business
Development
Customer Care
Service Order
Human Resources
General Services
Training /
Career Dev.
Legal Services
Procurement
Government
Relations
Special Tasks
External
Relations
Payroll
Billing/Collection
Budget /
Accounting
Internal Audit
Corporate Security
Asset Management
Real Estate
Facilities
Power / Utilities
Switch Operations
Corporate
ICT
Hosting / ISP
Tech Support
Planning /
Expansion
Backbone
Research /
Special Project

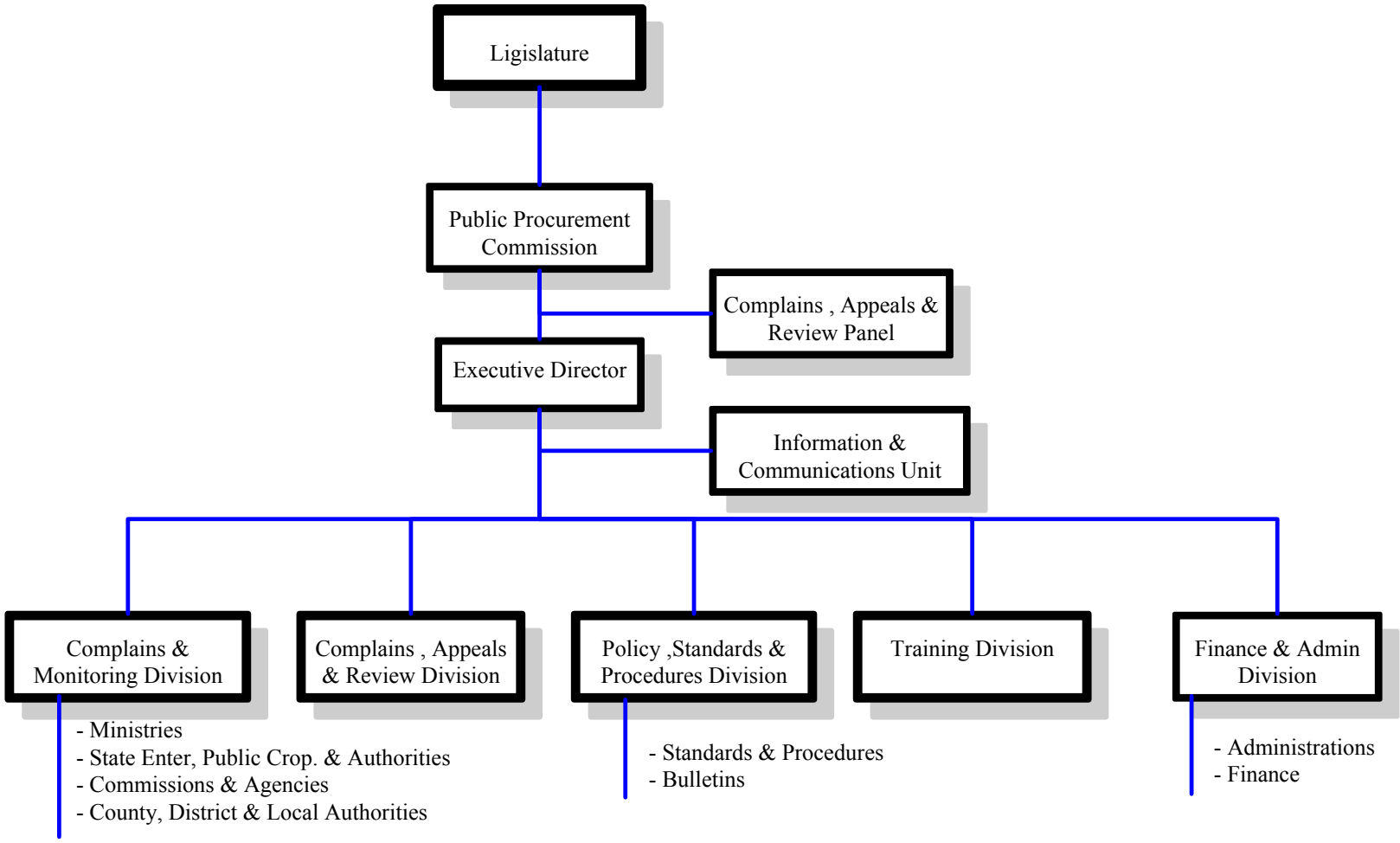
LISGIS ORGANIZATIONAL CHART



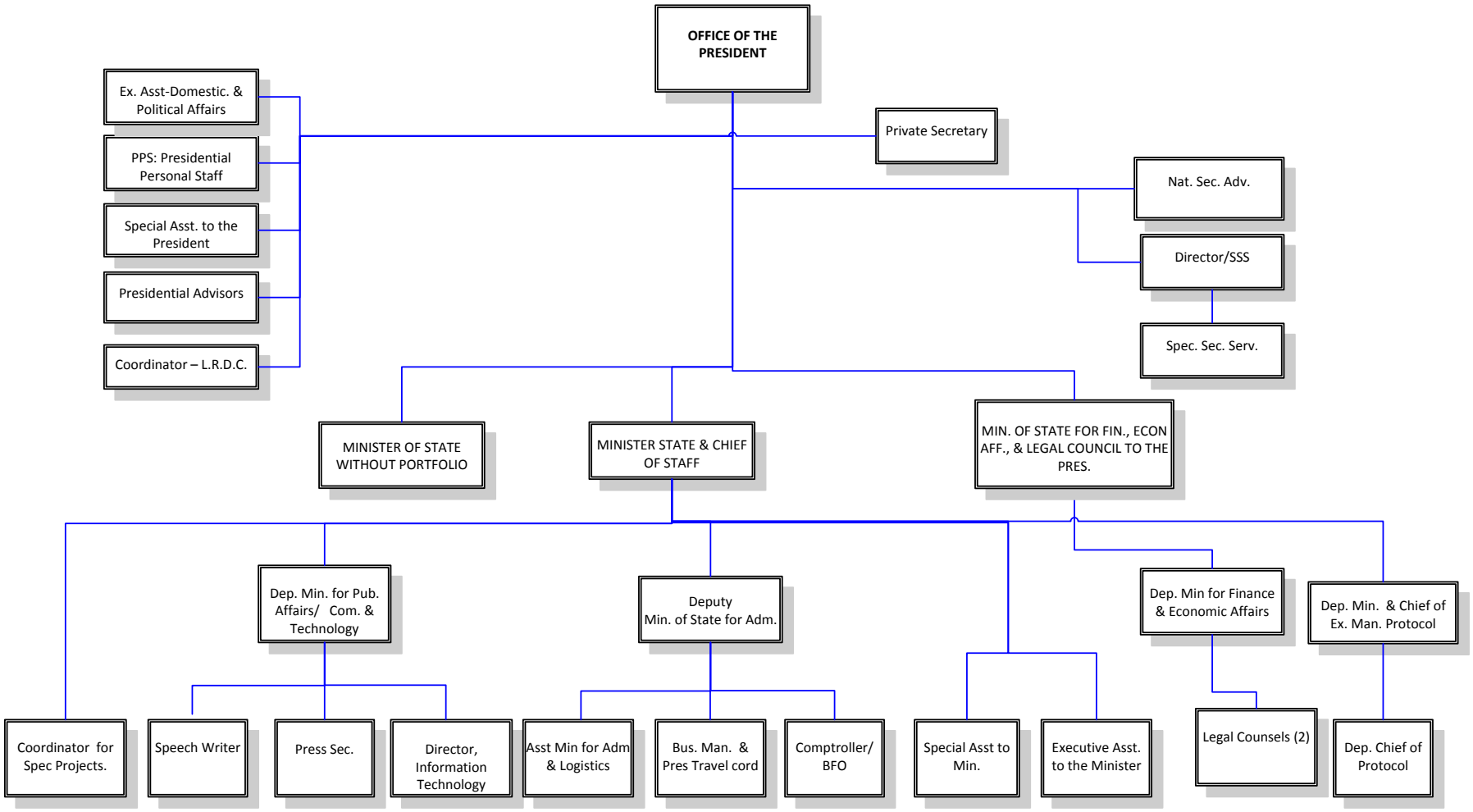
Ministry of Health and Social Welfare
Organizational Structure



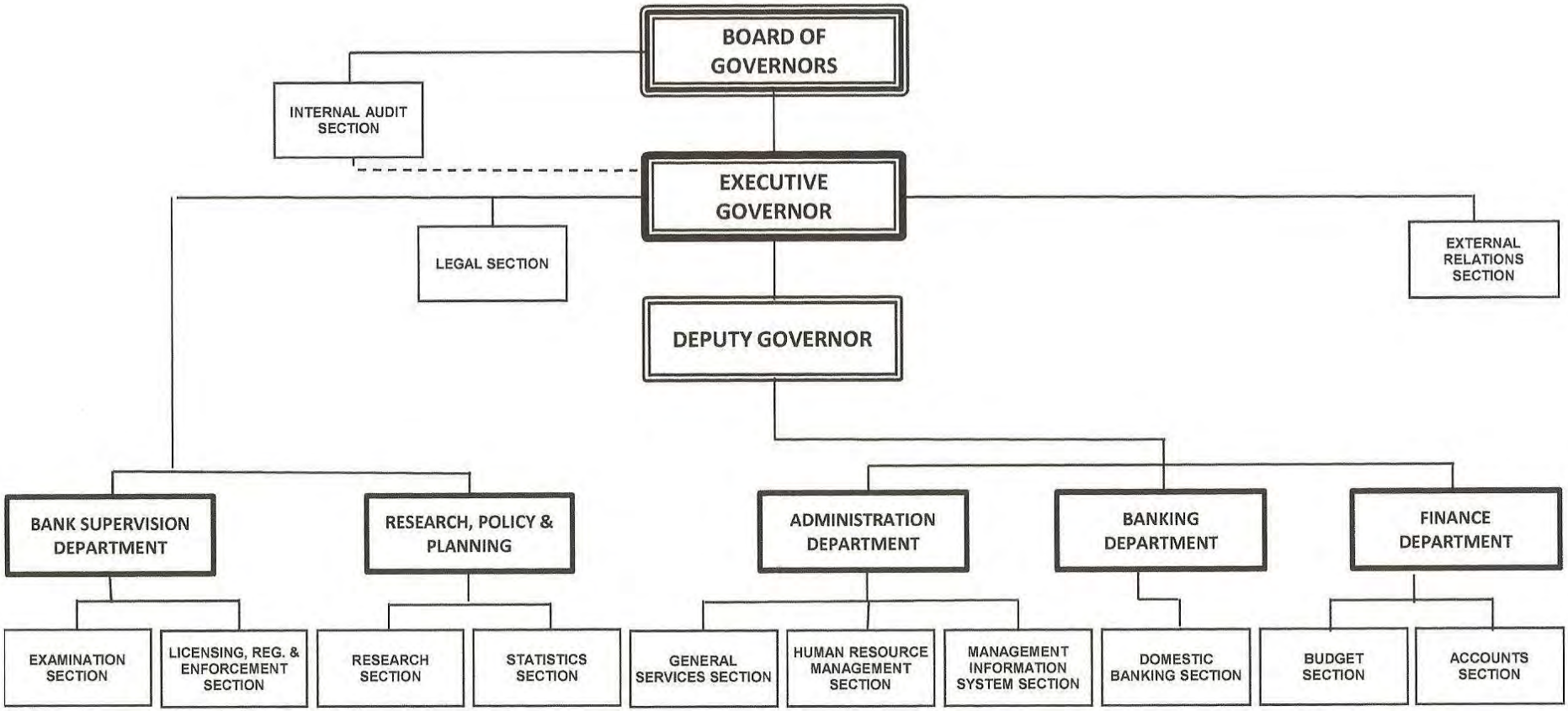
PUBLIC PROCUREMENT AND CONCESSIONS COMMISSION
STRUCTURE, OPERATIONS AND TRAINING
Organization Chart



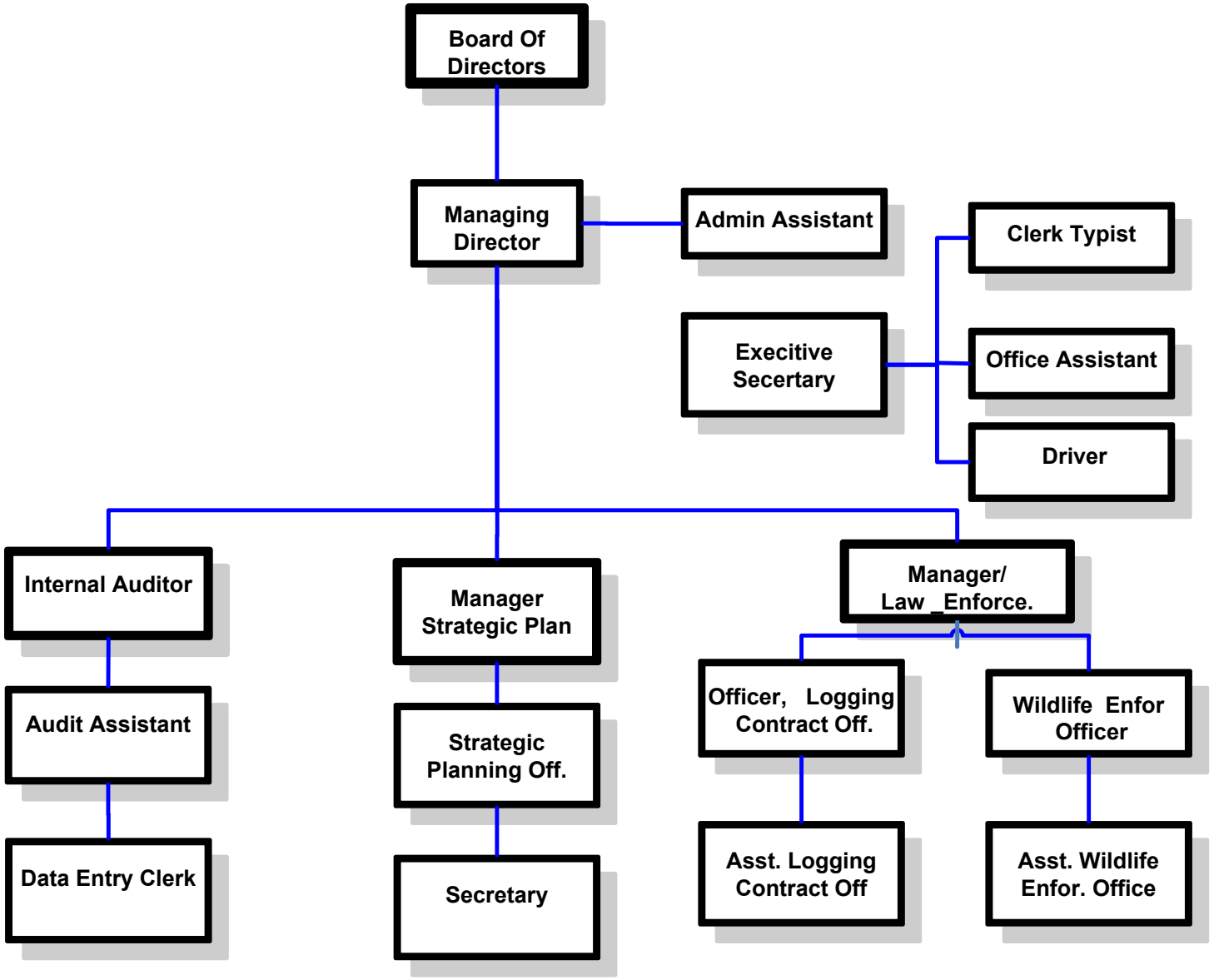
MINISTRY OF STATE FOR RESIDENTIAL AFFAIRS ORGANIZATIONAL CHART



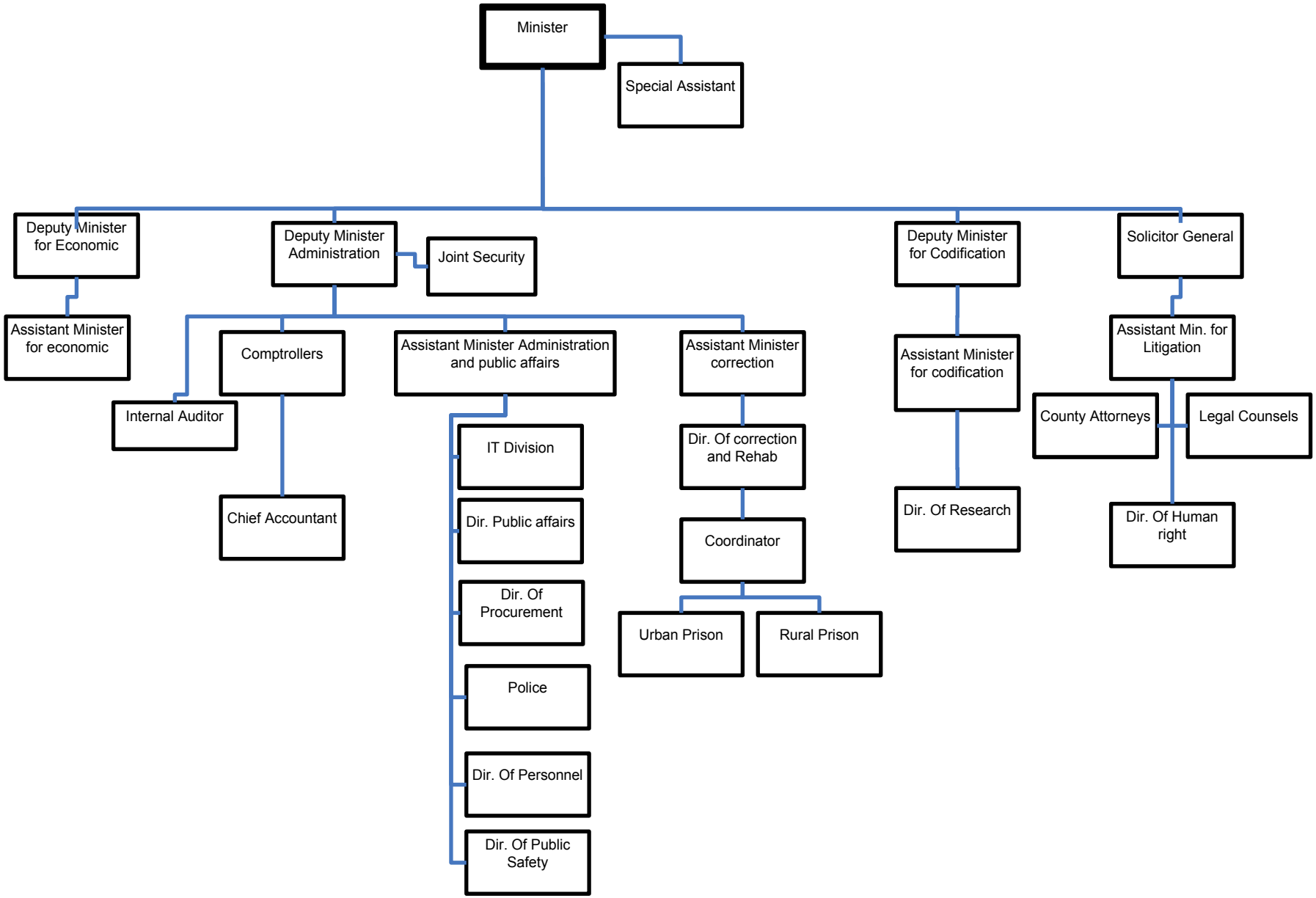
CENTRAL BANK OF LIBERIA—CBL ORGANIZATION CHART



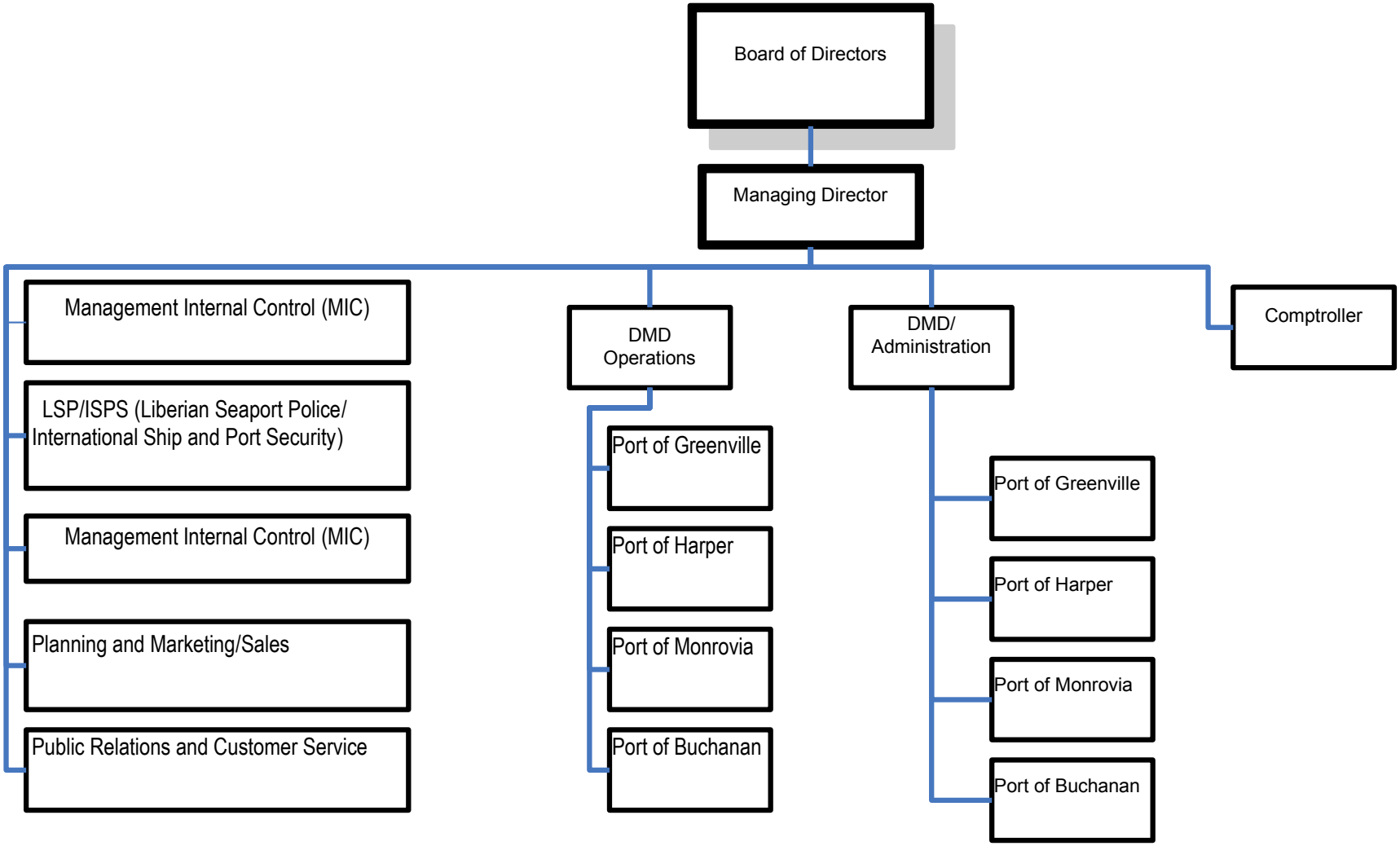
FDA - OFFICE OF THE MANAGING DIRECTOR



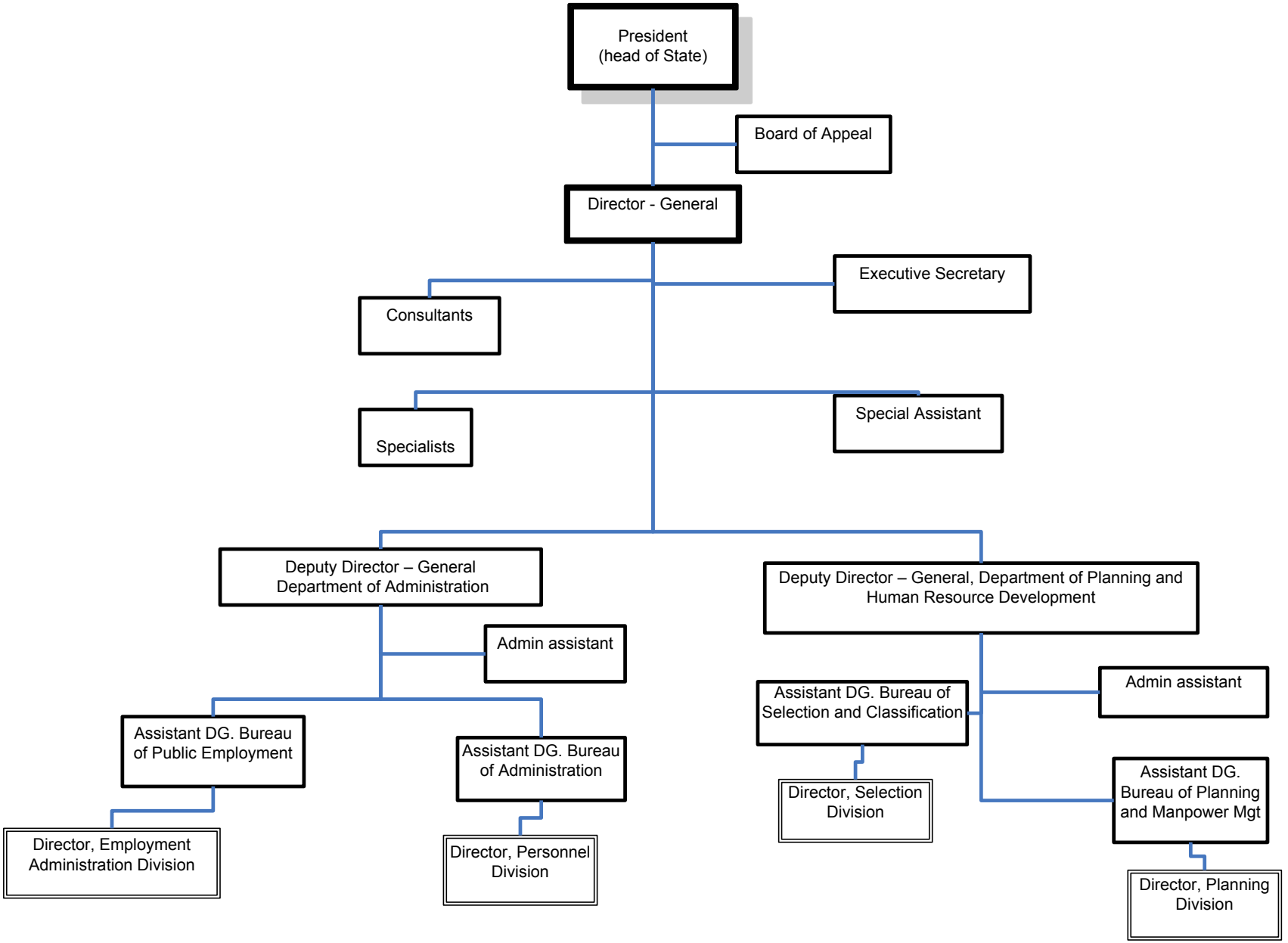
Ministry of Justice



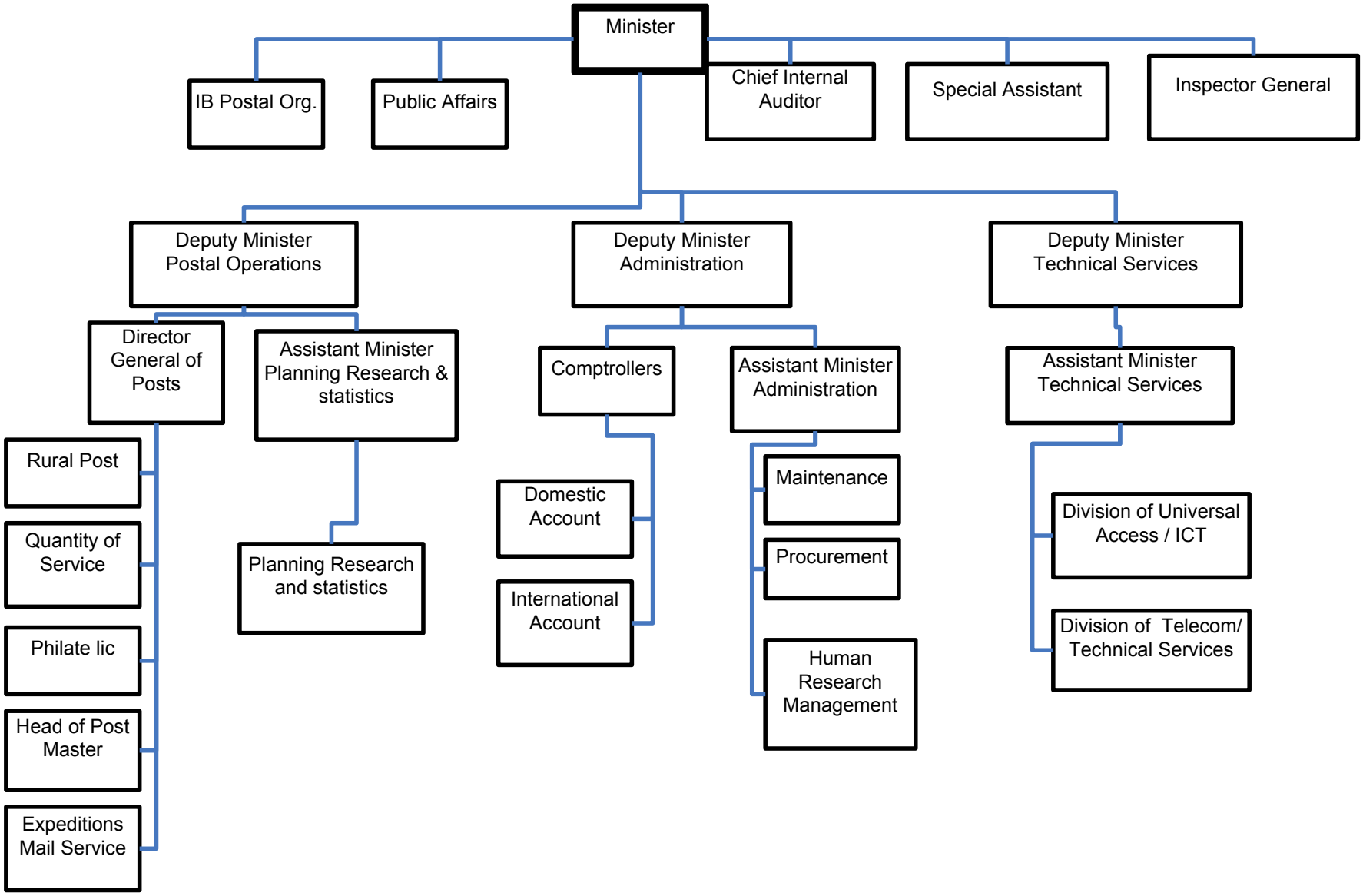
National Port Authority



Civil Services Agency



Ministry of Posts & Telecommunications



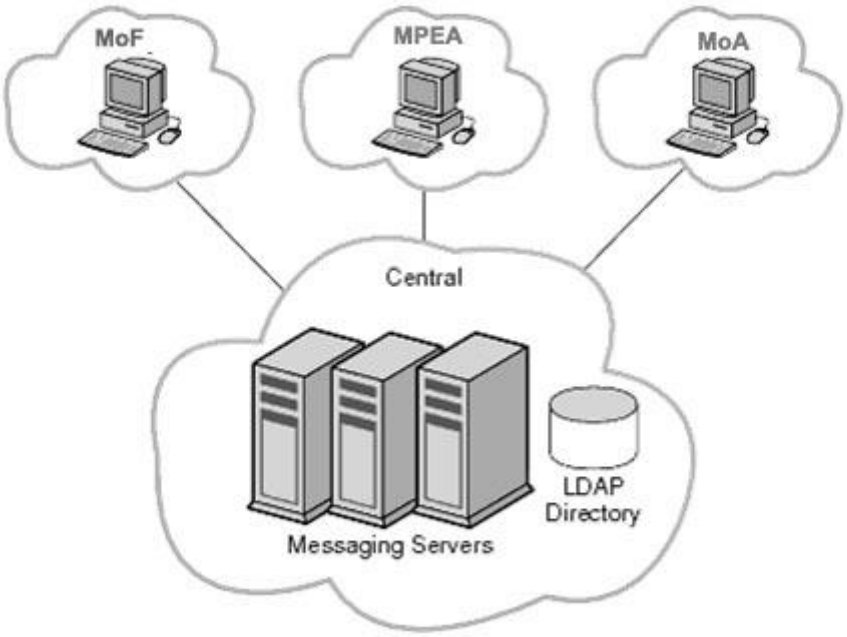
ANNEX 3: MESSAGING SYSTEMS TOPOLOGIES

A messaging topology is the design that describes the physical and logical layout of a networked messaging system. Specifically, a topology depicts the way the devices are arranged on a network and how they communicate with one another. In addition, a topology describes the way that data passes through a network. Topologies are bound to network protocols that direct the data flow.

CENTRAL TOPOLOGY

In a central topology, most or all major system components and messaging processes are located at one site. Clients at remote sites communicate over a Wide Area Network (WAN) to the centralized messaging servers. Figure 1 shows a central topology.

Figure 3-1. Central Topology



You should consider a central topology for your organization when:

- Messaging at remote sites is not missioning critical.
- Users tend to send and receive small text messages.
- Your organization is located in one physical location or distributed across many small user populations.
- You do not have remote support personnel.
- Good bandwidth exists between remote sites and the central site (at least ISDN or better).

There are advantages to implementing a central topology. In general, a central topology has lower hardware and support costs. Central topologies tend to be easier to manage because you have a simplified messaging architecture and a directory replication structure with fewer replication agreements. With a simplified architecture and no need to coordinate installation among geographically distant sites, a central topology is faster to deploy.

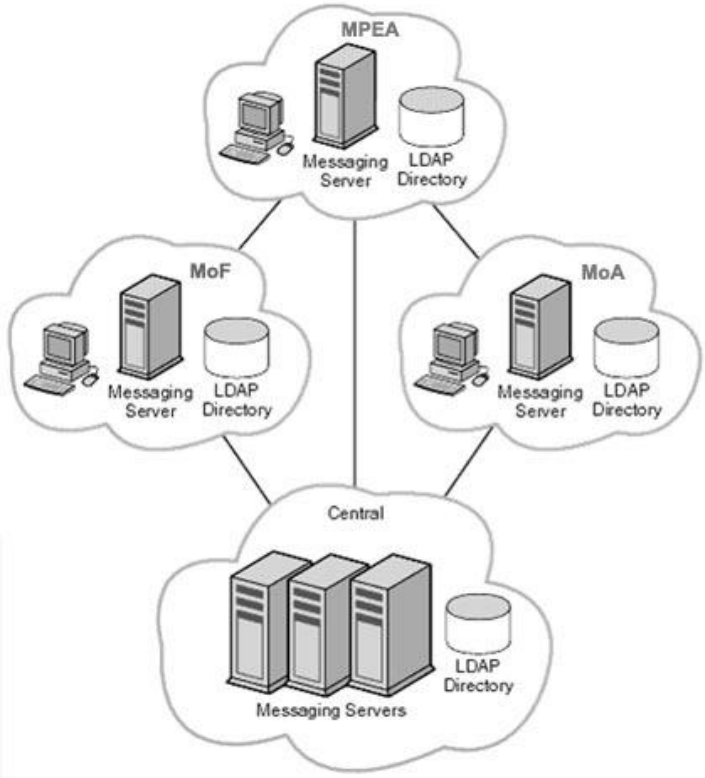
That said, there are an equal number of disadvantages to implementing a central topology. A centralized approach heavily relies on a WAN. If the network does not function properly, users at

the same site as well as users in remote locations could not send email to one another. Depending on network bandwidth and traffic, services might be slower during peak usage times. For users who send messages within the same domain, a central topology is inefficient. For example, looking at *Figure 1*, a message sent from one user in the Tokyo site would first travel to the Central site before being sent to another user in the Tokyo site.

DISTRIBUTED TOPOLOGY

In a distributed topology, most or all system components and messaging processes are distributed across multiple sites, usually at each remote site. Figure-2 shows a distributed topology.

Figure 3-2. Distributed Topology



You should consider a distributed topology for your site when:

- Messaging at remote sites is mission critical.
- Users send and receive large messages.
- You have large user populations at remote sites.
- Support personnel exist at remote sites.
- There is poor bandwidth to remote sites.

  If bandwidth significantly impacts your topology strategy, you should consider upgrading the bandwidth. In general, bandwidth is relatively inexpensive. You might also consider a Virtual Private Networking (VPN), which uses existing high bandwidth Internet pipes rather than dedicated lines behind a firewall.

There are advantages to implementing a distributed topology. Users at regional sites have faster access to their messages because they do not have to retrieve messages over the WAN.

Furthermore, messages sent within a regional location will incur less messaging traffic than in a central topology. However, satellite offices still rely on the WAN. Therefore, if lots of message traffic is generated in a satellite office, the WAN might need to be upgraded.

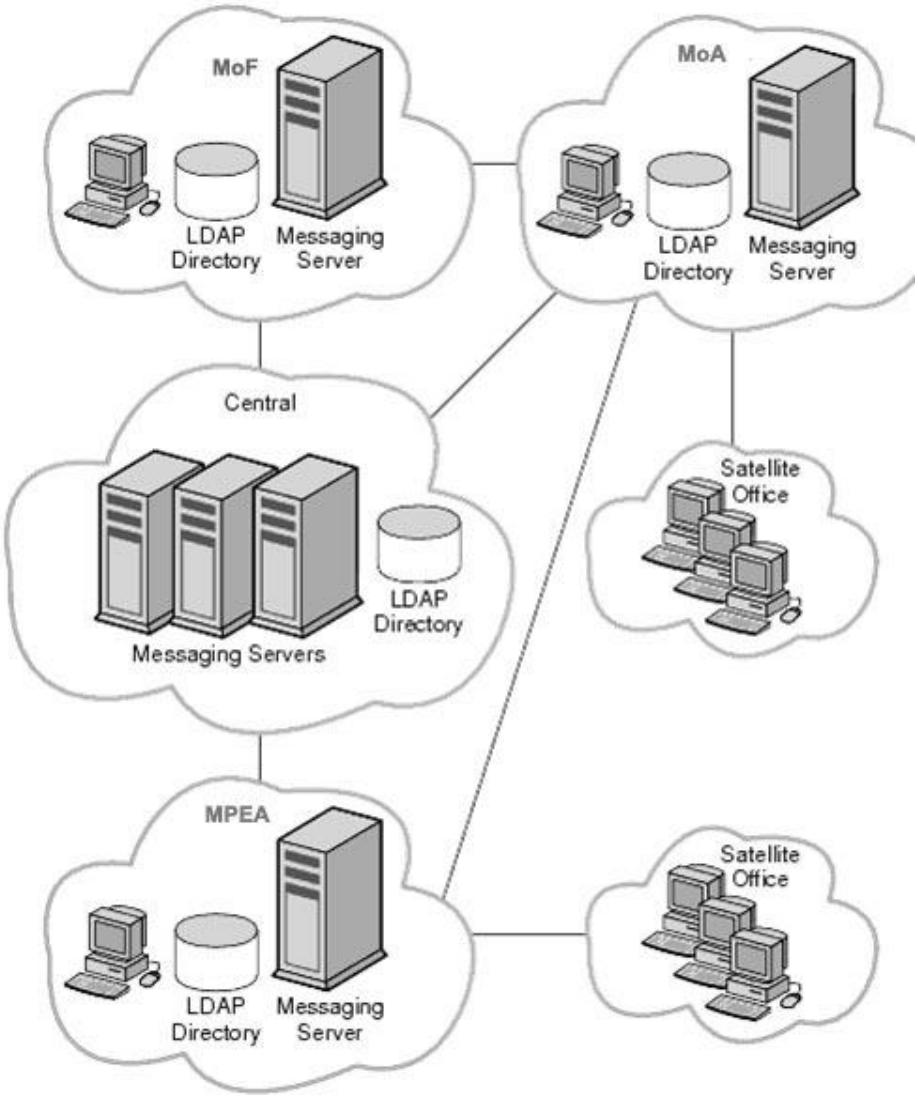
The disadvantages of implementing a distributed topology are that typically you will have higher hardware costs and higher support costs as you maintain more hardware at more locations. Support costs are also higher because of the complexity of the distributed topology. For example, failover in a distributed topology is more difficult to implement than in a central topology. In addition, it is much slower to initially deploy Messaging Server because there are multiple servers spread across multiple sites.

Because Messaging Server accesses the LDAP directory, the LDAP server is a critical link in the mail delivery process. If you don‘t use remote LDAP replicas, and the central LDAP is down, the messaging service will not be usable.

HYBRID TOPOLOGY

In a hybrid topology, central and distributed topologies are combined to meet the needs of an organization. Figure-3 shows a hybrid topology.

Figure 3-3. Hybrid Topology

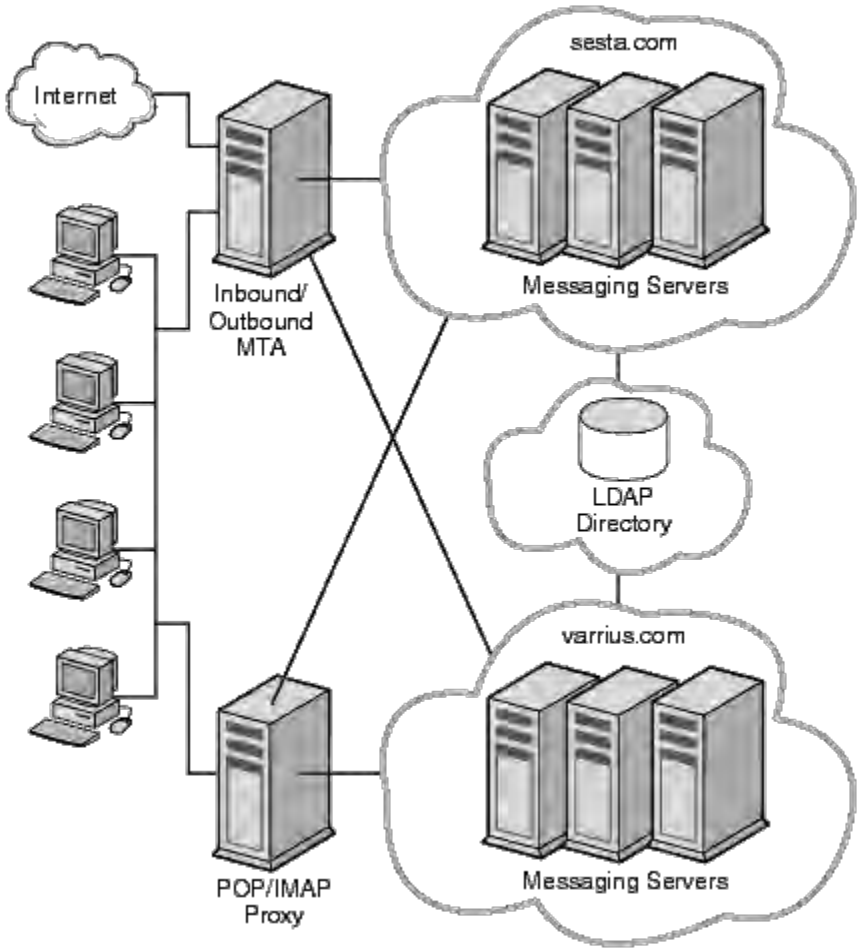


Organizations that benefit from a hybrid topology include those with many sites that have the ability to support a large user base. These sites that support them can house their own messaging servers. Some of these larger sites might have smaller satellite offices located in the general vicinity. But these satellite offices would not require their own messaging servers. Instead, the nearest major office would act as the central location for their services.

SERVICE PROVIDER TOPOLOGY

In essence, a service provider topology is a large-scale central topology. Typically, a service provider hosts multiple domains and has a larger customer base than an enterprise. Systems are centralized and are able to support multiple users during peak hours. Figure -4 shows a service provider topology.

Figure 3-4. Service Provider Topology



UNDERSTANDING MESSAGING TOPOLOGY ELEMENTS

This section describes the most common elements in a messaging topology. Having some familiarity with the basic elements will make it easier for you to design your own topology.

The following topics are covered:

- Messaging Topology Components
- Using MTAs to Protect Your Messaging System

- Using MMPs and MEMs
- Using Gateways

MESSAGING TOPOLOGY COMPONENTS

In Designing a Messaging Topology, you were introduced to three components of a messaging topology: Messaging Server, Directory Server, and clients. This section will describe other components in a basic messaging topology.

Messaging Server. Houses and maintains user mailboxes; it can also be a server that contains just the MTA portion of Messaging Server as described in **Internet-facing MTA** and **MTA Relay**.

Client. Accesses messaging services from Messaging Server (often through the Messaging Multiplexor).

Directory Server. Used by Messaging Server for name and alias lookup. Direct LDAP lookup determines where messages should be routed.

Messaging Multiplexor. Connects clients to the appropriate Messaging Server for retrieving messages.

Internet-facing MTA. Routes messages from the Internet and relays them across the firewall. Typically, a Messaging Server host is set up to perform this function.

MTA Relay. The inbound MTA routes incoming messages to valid addresses in the appropriate Messaging Server. The outgoing MTA accepts outgoing messages from clients, queries LDAP to find out where to send the message, then sends it off to the appropriate server or out across the firewall to the Internet. Typically, a Messaging Server host is set up to perform this function.

DNS Server. Resolves server names into IP addresses to allow messages to be routed to their proper address in the network.

Firewall. Restricts Internet access of your internal site. You might even have a firewall between departments in your organization.

USING MTAS TO PROTECT YOUR MESSAGING SYSTEM

You can use MTAs to protect your Messaging Server deployment, as well as to control the flow of message traffic to and from your site.

An Internet-facing MTA is a single point of contact that receives messages from sites external to your organization. An Internet-facing MTA sends the incoming messages across the firewall to the inbound MTA, typically another Messaging Server.

The inbound MTA then queries the directory to determine where to send the message within the organization. The Internet-facing MTA is located in the demilitarized zone (DMZ) of the firewall (between the external and internal walls of the firewall), and does not have access to any information about servers other than the inbound MTA.

The outbound MTA accepts outgoing messages from clients. It queries LDAP to find out where to send the message, then sends it off to the appropriate server or out across the firewall to the Internet. This offloads the MTA work from messaging servers that are used by users to retrieve messages.

USING MMPS AND MEMS

The MMP enables you to mask the layout of your Messaging Server hosts from your end users. Consequently, you assign users to a generic MMP or a load balancer without having them point to the specific server where their mail boxes reside. Message access clients point to the MMP for retrieving incoming messages.

When such a client connects and authenticates, the MMP looks up the user information in the directory to determine where the user‘s messages are held. The MMP then connects the client to that specific server. The following figure shows how the MMP acts as a proxy for IMAP4 and POP3 connections to Messaging servers. You can multiplex HTTP services (like Messenger Express) by enabling the MEM feature. The following figure shows how multiplexors function in a Messaging Server environment.

Use a load balancer in front of the multiple MMPs. It is unlikely that you would have a single MMP.

USING GATEWAYS

Your organization might contain legacy messaging systems that use proprietary methods for messaging handling, until you migrate your users, both messaging strategies must co-exist. To access these legacy systems, you can use an SMTP gateway, which enables SMTP connections between the new system and the other legacy systems. Usually legacy systems support SMTP connections so that the inbound MTA can route messages to it.

ANNEX 4: TECHNICAL SPECIFICATIONS RECOMMENDED FOR THE INTEROPERABILITY FRAMWORK OF GOL

Technical standards are categorized into four high level categories:

a. Application integration – technical specifications to enable application-to-application integration;

b. Information access and interchange – technical specifications for file exchange, character sets and encoding, etc.;

c. Security Domain – technical specifications to enable the secure exchange of information;

d. Interconnection Domain – technical specifications to enable communication between systems.

a) Application Integration		
Interoperability Area	**Recommended Specification(s)**	**Remarks**
Simple functional integration in an open environment (e.g. information retrieval from a remote application)	The suite of core Web Services standards : SOAP v1.1 for remote service invocation WSDL v1.1 for remote service description (where necessary) UDDI v2 for the publication and discovery of remote service descriptions	When project teams select products to implement Web Services, they are recommended to take into consideration the products' conformance to the WS-I's Basic Profile 1.1. In addition, project teams should implement their Web Services requests and responses in accordance with the WS-I Basic Profile 1.1.
Reliable message exchange between application systems in an open environment for business document oriented collaboration	ebMS v2 (ISO/TS 15000- 2:2004)	Standards for reliable messaging are also emerging under the Web Services framework. Joined-up applications that are following Web Services standards should agree among the stakeholders on whether to adopt ebMS or some alternate protocol for reliable message exchange.
Secure exchange of messages in a Web Services environment	WS-Security 1.0	Project teams should closely monitor the development of the WS-I Basic Security Profile and follow its recommendations when it is ratified.

b) Information Access and Interchange		
Interoperability Area	**Recommended Specification(S)**	**Remarks**
Hypertext Web content	HTML and XHTML as implemented by commonly adopted versions of browsers	The content providers and application developers should state on their Web page how the content can best be viewed. They are also recommended to test their content against the prevailing versions of popular browsers such as Microsoft Internet Explorer and Mozilla Firefox.
Client-side scripting	ECMA 262 Script 3rd Edition	
Mobile Web content	WML 1.3 – for use with WAP devices HTML and XHTML as implemented by commonly adopted browsers on mobile devices – for use with mini-browsers XHTML Mobile Profile v1.1 – for use with mini-browsers on resource-constrained devices like mobile phones	Content authors are recommended to test their content against different popular browsers.
Document file type for content publishing	HTML and XHTML as Implemented by commonly adopted versions of browsers PDF	The HTML content providers should state on their document how the content can best be viewed. They are also recommended to test their content against the prevailing versions of popular browsers such as Microsoft Internet Explorer and Mozilla Firefox. The PDF content providers should indicate which viewer software the recipients can use and supply a link to the viewer software if necessary.
Document file type for receiving documents under ETO	.txt .rtf v1.6 HTML PDF v1.2, 1.3, 1.4, 1.5, 1.6 or 1.7 (ISO 32000-1)	For HTML file types, members of the public should use only those HTML features that are implemented in common by Microsoft Internet Explorer 6/7 and Mozilla Firefox 3.x.
Attachment of digital signature to electronic documents received under ETO	PKCS #7 v1.5 (RFC 2315) S/MIME v3 PDF v1.5, 1.6 or 1.7 (ISO 32000-1)	For electronic submissions via email pursuant to the ETO, members of the public should use only those S/MIME v3 features that are implemented in common by Microsoft Outlook Express 6.x and Mozilla Thunderbird 2.0 or above.
Formatted document file type for collaborative editing	.rtf v1.6 HTML and XHTML as implemented by commonly adopted versions of browsers	If the sender is uncertain what office software the recipients are using, the sender should send the documents in a format (e.g. .htm, .rtf, .doc) that common office software available in the market are able to handle.

b) Information Access and Interchange		
Interoperability Area	**Recommended Specification(S)**	**Remarks**
	.doc (Word 97 file format which is used by Word 97 and later versions) .odt (OpenOffice.org v2.0 file format based on OpenDocument 1.0)	However, if both sides are using office software that belongs to the same family, then tool-specific format like .sxw may be used for file exchange. For HTML documents, the sender is also recommended to test their content against the prevailing versions of popular browsers such as Microsoft Internet Explorer and Mozilla Firefox.
Presentation file type for collaborative editing	.ppt (PowerPoint 97 file format which is used by PowerPoint 97 and later versions) .odp (OpenOffice.org v2.0 file format based on OpenDocument 1.0)	If the sender is uncertain what office software the recipients are using, the sender should send the presentation in a format (e.g. .ppt) that common office software available in the market are able to handle. However, if both sides are using office software that belong to the same family, then tool-specific format like .sxi may be used for file exchange..
Spreadsheet file type for collaborative editing	.xls (Excel 97 file format which is used by Excel 97 and later versions) .ods (OpenOffice.org v2.0 file format based on OpenDocument 1.0)	If the sender is uncertain what office software the recipients are using, the sender should send the spreadsheet in a format (e.g. .xls) that common office software available in the market are able to handle. However, if both sides are using office software that belong to the same family, then tool-specific format like .sxc may be used for file exchange
E-mail format	MIME (RFCs 2045, 2046, 2047, 2048, 2049, 2231, 2387, 2392, 2557, 2646, 3023)	
E-mail security	S/MIME v3	For electronic submissions via email pursuant to the ETO, members of the public should use only those S/MIME v3 features that are implemented in common by Microsoft Outlook Express 6.x and Mozilla Thunderbird 2.0 or above
Graphical / Image file types	.jpg – for images that will tolerate information loss .gif v89a – for images that will tolerate information loss with few colours and limited graduation between colours ;.tif v6 – good for images that will not tolerate information loss; .png second edition – as an alternative to gif v89a offering greater compression and	

b) Information Access and Interchange		
Interoperability Area	**Recommended Specification(S)**	**Remarks**
	where control over transparency is required epsf v3 – for images that require editing and/or which are included in PostScript printed output	
Character sets and encoding for Web content	ISO/IEC 8859-1:1998 – for encoding content in English ISO/IEC 10646-1:2000 and HKSCS-2001 – for encoding content in English or Chinese (Chinese characters are restricted to the Chinese-Japanese-Korean Unified Ideographs characters coded in the ISO 10646 standard and the HKSCS-2001) BIG-5 and HKSCS-2001 – for encoding content in Chinese	For the correct display of Web content, the content provider should specify the character encoding in the document explicitly. ISO 10646 is the standard for the common Chinese language interface. Except for special operational needs, Unicode (ISO/IEC 10646 or UTF-8) shall be adopted for new Chinese version websites or websites undergoing major revamp. The International Ideographs Core (IICORE), a subset of the ISO 10646 standard (comprising the most commonly used characters) designed for use on resource-limited devices, was published in the ISO 10646:2003 Amendment 1.
Character sets and encoding for other types of information exchange	ASCII – for encoding content in English ISO/IEC 10646-1:2000 and HKSCS-2001 – for encoding content in English or Chinese (Chinese characters are restricted to the Chinese-Japanese-Korean Unified Ideographs characters coded in the ISO 10646 standard and the HKSCS-2001) BIG-5 and HKSCS-2001 – for encoding content in Chinese	Where applicable (e.g. in XML documents), the content provider should specify the character encoding in the document explicitly (e.g. use <?xml encoding='UTF-8'?> to specify the UTF-8 encoding in an XML document). ISO 10646 is the standard for the common Chinese language interface. Except for special operational needs, Unicode (ISO/IEC 10646 or UTF-8) shall be adopted for new Chinese version websites or websites undergoing major revamp. The IICORE was also published in the ISO 10646:2003 Amendment 1.
Removable storage media for receiving documents under the ETO	3.5” 1.44MB floppy diskette in MS-DOS format CD-ROM in ISO 9660:1988 format DVD-ROM in ISO/IEC 13346:1995 format	
Animation	Macromedia Flash (.swf) Apple Quicktime (.qt, .mov, .avi) Macromedia Shockwave (.swf)	The content provider should ensure that appropriate viewers/codec’s are openly accessible to the consumer (e.g. as freeware downloadable from the Internet), and should provide a pointer to the viewer/codec’s as necessary.

b) Information Access and Interchange		
Interoperability Area	**Recommended Specification(S)**	**Remarks**
Moving image and audio / visual	MPEG-1 (ISO 11172) – for video and audio .mp3 (ISO 11172) – for audio MPEG-4 (ISO 14496) – for video and audio	The content provider should ensure that appropriate viewers/codec's are openly accessible to the consumer (e.g. as freeware downloadable from the Internet), and should provide a pointer to the viewer/codec's as necessary.
Audio / video streaming	Real Audio / RealVideo (.ra, .ram, .rm, .rmm) Windows Media Formats (.asf, .wma, .wmv)	The content provider should ensure that appropriate viewers/codec's are openly accessible to the consumer (e.g. as freeware downloadable from the Internet), and should provide a pointer to the viewer/codec's as necessary.
E-Business document / data message formatting language	XML and related W3C recommendations produced by the W3C XML Core Working Group	XML users are recommended to create or generate XML 1.0 documents if they do not need the new features in XML 1.1, and to ensure as far as possible that their XML parsers can understand both XML 1.0 and XML 1.1.
XML schema definition	XML Schema 1.0 – for data- oriented message DTD as defined in the corresponding XML specification – for textual document-oriented applications	
XML message encryption	XML Encryption	
XML message signing	XML Signature	
Content syndication	RSS 1.0 or RSS 2.0	The content provider is free to use either RSS 1.0 or 2.0, while the content consumer should ensure that the RSS Reader can support both RSS 1.0 and 2.0.

c) Security Domain—Technical Specifications to Enable the Secure Exchange of Information		
Interoperability area	**Recommended specification(s)**	**Remarks**
IP network-level security	IPsec	
Transport-level security	SSL v3.0 TLS v1.0	New implementations should ready themselves to support TLS and should ensure their TLS implementation's backward compatibility with SSL v3 where situation allows
Symmetric encryption algorithms	DES 3DES – comparatively harder to break AES – comparatively harder to break	The choice of algorithms depends on the level of security required. In addition, AES supports key lengths of 128, 192 and 256 bits offering different levels of cryptographic strength. The interacting parties should either agree before implementation on the algorithm to use or should enable some auto-negotiation mechanism.
Asymmetric encryption algorithms	RSA	
Digital signature algorithms	DSA RSA for Digital Signatures	The interacting parties should either agree before implementation on the algorithm to use or should enable some auto-negotiation mechanism.
Hashing algorithms for digital signature	SHA-1 SHA-256, SHA-384 and SHA512	
Cryptographic message syntax for file-based signing and encrypting	PKCS #7 v1.5 (RFC 2315)	
On-line certificate status protocol	RFC 2560	
Certification request	PKCS #10 v1.7 (RFC 2986)	
Certificate profile	RFC 3280 (X.509 v3)	
Certificate revocation list profile	RFC 3280 (X.509 v2)	
Certificate import / export interface	PKCS #12 v1.0	

c) Security Domain—Technical Specifications to Enable the Secure Exchange of Information		
Interoperability area	**Recommended specification(s)**	**Remarks**
Cryptographic token interface	PKCS #11 v2.11 Microsoft CryptoAPI	Cryptographic tokens not dedicated for a specific purpose should support both interfaces. Applications that use cryptographic tokens may choose to use either of these interfaces
Cryptographic token information syntax	PKCS #15 v1.1	
Privacy policy	P3P v1.0	
Exchange of authentication and authorization information	SAML v1.1 SAML v2.0	
Time stamping protocol	RFC 3161 (X.509 PKI TSP)	

d) Interconnection Domain—Technical Specifications to Enable Communication Between Systems		
Interoperability area	**Recommended specification(s)**	**Remarks**
E-mail transport	SMTP (RFCs 2821, 2822)	
Mail box access	POP3 – for basic mail box access IMAP4 rev1 – for more advanced functionality allowing clients to manipulate messages on the server	
Hypertext transfer protocol	HTTP/1.1	
Directory access	LDAP v3	
Domain name service	DNS IDN	

d) Interconnection Domain—Technical Specifications to Enable Communication Between Systems		
Interoperability area	**Recommended specification(s)**	**Remarks**
File transfer	FTP HTTP/1.1 SFTP	The FTP and HTTP protocol on their own have no provision for data encryption. Project teams demanding data encryption may use SFTP or use FTP/HTTP over a secure channel to enable secure file transfer. For server-to-client secure file transfer in a Web-based environment, the simplest way is to use HTTP over SSL/TLS to avoid having to install client-side software.
LAN / WAN interworking	IPv4 / IPv6	IPv4 hosts are unable to communicate directly with IPv6 hosts, and vice versa. Solutions based on upper layers of network protocols are required for interoperability between IPv4 and IPv6 hosts. IPv4 and IPv6 are expected to co-exist for a long period of time due to the prominent role IPv4 is currently playing. Project teams are highly advised to select products that support or with roadmap to support IPv6 in addition to IPv4.
LAN / WAN transport protocol	TCP – preferred transport protocol over UDP UDP – where required e.g. to support particular protocols	
Wireless LAN	IEEE 802.11b IEEE 802.11g IEEE 802.11n	Products of Wireless LAN with Wi-Fi Certification are recommended in order to ensure the interoperability between different manufacturers. All new access points are highly recommended to support IEEE 802.11g. New client devices are also recommended to support IEEE 802.11g where possible. Due consideration should be given to deploy 802.11n when designing new wireless network as the technology has been adopted in the market for years before it was finalized
Wireless LAN security	WPA WPA2	In addition to WPA, WPA2 provides a stronger encryption mechanism through AES, which is a requirement for some corporate and government users
Mobile device	WAP v2.0 – for use with WAP	
Internet access	devices HTTP/1.1 – for use with mini-browser	

ANNEX 5: CHIEF INFORMATION OFFICER (CIO)

The GoL ministries and agencies are trying to develop their ICT Infrastructure and information systems through multiple individual initiatives. There is no currently any type of team work, national planning or resources sharing between the GoL entities.

The CIO regime generally completes those missing pieces in the development initiatives, taking multiple individual initiatives, and consolidating it into a national development program, providing information sharing, resources sharing, standards and technical support to those initiatives to succeed as a ICT Infrastructure development national program.

A) CHIEF INFORMATION OFFICER—CIO

The CIO, is typically defined as the Head of the Information Systems in an organization, which implies that he should be the most experienced and senior technical person in his organization.

However, there is no specific qualification is typical of CIOs in general. In the past, many have expertise in computer science, software engineering, or information systems, but this is not universal; Increasingly CIOs, especially those from a technical background, hold Master of Business Administration or Master of Science in Management degrees. More recently CIOs' leadership capabilities, business acumen and strategic perspectives have taken precedence over technical skills. It is now quite common for CIOs to be appointed from the business side of the organization, especially if they have project management skills.

In Liberia, The main role of the CIOs in the GoL ministries and agencies is to execute the national ICT Policy, utilize ICT to transform government processes from manual processes to automated processes, reaching to the implementation of e-government.

Functional roles of the CIO

1. **Systems Integration and Efficiency**
   - Responsible for planning and execution of information technology IT portfolio and associated acquisition.
   - Manages the Business Process Improvement and strategic alignment of business systems.
   - Develops guidance, procedures and standards for change management, data/database management, system development, systems testing and deployment.
   - Central point for engineering or modernization of business information systems for internal and external customers in support of Ministry/agency‘s mission, goals and objectives.
   - Manages information technology system performance, operation, maintenance and customer satisfaction.
2. **Policy and E-Government**
   - Provides support to the ICT Governing Board (presently ICT4D Steering Committee provides leadership to the Technology Investment Boards (Working Group and Executive Committee);
   - Focal point with the Bureau of the budget concerning the Ministry/agency‘s ICT policies;
   - Responsible for the oversight of the ministry‘s Reporting Program and focal point for the management of the CIO's Web page;

- Oversees the CIO's Executive Mansion‘s activities as they relate to the Annual Performance Plan and other management issues;
- Assists in the development and implementation of electronic government strategies and policies in compliance with international best practices.

3. IT Governance and Technology Investment

- Acts as the IT capital planning and investment control focal point with GOL.
- Provides economic and risk analysis of proposed ICT investments.
- Develops and implements a Departmental information technology performance measurements program.
- Implements a program for information technology skills analysis for all employees, including executives, end-users, and ICT professionals of the ministry.
- Identifies and implements mechanisms in which to leverage ICT to better support GOL‘s business operations.

4. IT Operations

- Deliver technical assistance and overall support for GOL‘s national initiatives and daily operations.
- Implement CIO policies, standards and guidelines.
- Perform innovative strategic planning for services related to Information Technology infrastructure.
- Maintain and monitor Information Technology Infrastructure, including computer services, operations and maintenance.
- Provides systems engineering oversight and performance management.
- Provides oversight of systems integrity and quality assurance activities.
- Provides Independent Validation & Verification (IV&V) for Contractor oversight and monitoring activities and performs cost analysis and estimating actions.

5. Enterprise Architecture

- Principal advisor to the Chief Information Officer regarding GOL‘s integrated and complex computing environment. The mission is to inform, guide, and govern the strategic decisions for the enterprise, especially those related to ICT investments; also:
- Helps to simplify ICT investment decision-making by illustrating the implications of business and ICT decisions;
- Ensures the acquisition of technologies that adequately support business and information needs;
- ensures GOL information systems meet customer and stakeholder quality needs;
- Facilitates information sharing among the program offices;
- Reduces systems diversity;
- Highlights opportunities for building greater flexibility into applications;

- Performs Annual Performance Plan-related data quality assessment and certification.

6. IT Strategic Planning and Communication

- Principal advisor on strategic planning process for information technology that establishes a collaborative strategic relationship between the CIO and GOL's senior political executives, core program offices and support offices.
- Is primarily responsible for the design, development, and management the GOL Information Technology strategic planning process.
- Provides comprehensive short-term to long-range guidance and principle policy focus for the development of the Agency‘s Information Technology Strategy.

7. Administrative Services

- Provides effective and efficient administrative service support to the Office of the Chief CIO‘s Office to the extent that the organization can continue to support the overall mission, goals and objectives of the Department;
- provides basic resource management in the areas of personnel, space, training, travel, budget and other essential resource related needs of the CIO workforce;
- develops and monitors procedures for tracking and monitoring CIO Working Capital Fund contract requests (if applicable in future);
- Develops and executes the CIO Training Plan as well as being the main point of contact with the business community.

8. ICT Security

- Provides advice to the Chief CIO (MoPT) on matters related to the safety and security of GOL's ICT resources.
- Oversees protection of the confidentiality, integrity, and availability of information residing on, or processed by, ministry‘s information technology systems;
- Assures the privacy of data related to ministry‘s customers, business partners, and employees;
- Helps to monitor ministry‘s mainframe, midrange and microcomputer systems, personal computer workstations, laptops, local and wide area networks (intranets), and the Internet.
- Develop and implement security programs, policies, and procedures to ensure the security, reliability and accessibility of information systems.

It‘s important to highlight that the CIO will be reporting to His / Her Minister and is recommended to be in the assistant Minister Level or Director. This will enhance the decision

B) CIO COUNCIL:

The CIO Council is an advisory unit, grouping all CIOs in the government, with the ICT Stakeholders, to share information, experiences and strategies.

The Chief CIO, who would be represented by Ministry of Post and Telecom (MoPT) as the ICT Sector leader, should act as communication channel between the Policy Makers and the policy implementers (CIOs) . Such communications should be a 2 way communications, enabling policy makers (MoPT, MPEA …) to have a real overview of what is happening in the GoL ICT Sector.

The CIO Council should agree on a meeting and reporting mechanism to ensure the smooth flow of information to the Policy Makers.

A recommended meeting and reporting scheme would be:

1. The CIO Council should meet every 1 month to follow up their progress, and share their experiences.
2. Each CIO should present a quarter annual reports to the Chief CIO, Such report is not an evaluation report; however it reflects to the indicators of development in the ICT sector, and updates the Policy makers‘ information.
3. Each CIO should present an Inventory report of his ICT Assets to the chief CIO, such reports will serve also as indicators to the capacity building progress in each ministry.
4. Each CIO should present in the beginning of the year an ICT Development plan for his/her Ministry and a quarter annual reports to indicate the accomplishments and progress done.
5. The Chief CIO should consolidate such reports and update development indicators, reporting to the ICT4D SC and the Policy Makers.

ANNEX 6: E-GOVERNMENT PROJECT MANAGEMENT OFFICE

WHAT IS A PMO

A Program Management Office is an entity that provides a structure to act as a coordinator of a program of projects; as a creator and watchdog of standards; as a supplier of information to Steering Committees and Change Management Boards. To give an example;

Each project would have a Business and Benefits case; the job of the PMO is NOT to specifically write the Business Case, but to evaluate and validate it based upon the parameters set by the CIO, CTO or CFO etc…. This might be the number of resources available; the total program budget or any other previously agreed criteria used to measure the TOTAL benefit to, say, MoPT.

Another responsibility it would have is to monitor the agreed business case to ensure that the statements being made are realized. Obviously every function in a PMO can be re-structured to fit the organization, to continue the business case example; Management may want PMO staff to act as mentors to Project Officers who have previously never written a business case.

The PMO will only have **authority** over projects in respect of the application of program and project management methods, procedures and support tools. The Change Management Board via the Senior Responsible Owners and Program/Project Boards will provide **direction** of the Projects for each sub-program and their associated projects.

However the functions are allocated; it is important to remember that the PMO must have an independence from individual projects and that its‘ decisions should be based upon the wider picture of the total program.

The ICT4D Steering committee is the driving force behind the PMO. The make-up is dependent on the power that the PMO is intended to have. It would include the PMO Director and ideally include at least one e-Gov Minister.

MISSION

The mission of the e-Gov PMO is to improve the business performance of e-Government project initiatives by improving project delivery effectiveness. The PMO functional areas are provided in details in the scope section.

The Program Charter provides a shared understanding and agreement between all stakeholders & participants about deliverables, methodologies and commitment required.

GOALS AND OBJECTIVES

The goal of the e-Gov Program Management Office is to improve the business performance of e-Gov initiatives by improving the project delivery effectiveness of project teams.

The e-Gov Program Management Office (PMO) will:

- Monitor project progress and produce performance analyses to provide leadership with significant insight into the state of all projects
- Ensure the usage of standard project management processes
- Implement and maintain project office standards, tools, and processes
- Establish risk assessment guidelines
- Enable the sharing of knowledge and best practices amongst project managers

- Maintain existing and develop new relationships, both inside and outside of the e-Gov initiatives, that will reinforce the ability of the PMO to deliver _business value‘
- Act as the single point of contact for requests of project teams to provide information to other Government entities.
- Maintain the efficiency of the PMO.

THE COMPOSITION OF THE PROGRAM MANAGEMENT INFRASTRUCTURE

The Program Management Infrastructure will comprise a structured environment to support the implementation of the E-Government initiatives, monitoring of progress of and the means to administer metrics related to the measurement of performance against objectives as part of the change process.

The Program Management Infrastructure will include:

- A Program Management Office managed and resourced to support the nature and extent of any change program Plan.
- A program management method and supporting standards, procedures and tools.
- A program assurance function.
- The necessary automation to ensure that the office can be run efficiently.

CONSTRAINTS FACING THE PMO

- Lack of a consistent program management culture across the-Government
- Time frame in which to plan and integrate the Program Management Office into the overall process management efforts
- Insufficient Architecture (Hardware, Software and Communications) to support an integrated program management information system
- Lack of staff to carry out the detail required to support the PMO
- Inconsistent collection of clearly delineated metrics as part of the program management activities
- Lack of a universal program registration system i.e. the PMO needs to be aware of all programs that are being initiated across the Government.
- Lack of enforcement powers to ensure that the PMO has the authority necessary to succeed in its objectives.

SCOPE

The scope of the e-Gov PMO is to manage work and internal and external projects (initiatives), consistent with project management direction.

QUALITY MANAGEMENT

The PMO is custodian of standards and will ensure that each project produces a quality plan describing the standards to be followed and how compliance will be ensured; responsibilities should include configuration management.

GOVERNANCE

Governance is executing the processes necessary to provide management at all levels of e-Government, with insight into the state of both external and internal projects. This area includes:

- Categorizing of projects to define management review levels
- Involving appropriate level of e-Gov management in the oversight of projects
- Escalating and resolving project issues
- Establishing periodic, comprehensive, in-depth reviews of _key' e-Gov projects
- Ensuring that projects in a red or yellow status have action plans to return to green status
- Ensuring that projects have a risk plan that meets or exceeds the risk assessment guidelines of the e-Gov PMO

PROGRESS AND PERFORMANCE REPORTING

Progress and Performance Reporting records, tracks, produce performance analyses, and reports the state of e-Gov projects. Functions included are:

- Project recording and tracking
- Status reports
- Metrics Analysis
- Risk assessment
- Identification of high profile projects
- Project reviews
- Report distribution

PROCESS MANAGEMENT

This area provides direction for, and assurance of, project management processes, and includes:

- Ensure the usage of standard project management methodologies, standards and tools
- Provide performance oversight of e-Gov project management processes including supporting Value Assurance reviews
- Identifying improvements to project management processes and standards
- Document process for initiating and monitoring internal projects
- Define issue management process including escalation process
- Define risk management process including escalation process
- Act as the focal point for tracking Change Requests (CR) through the review process and maintain the CR Repository

RELATIONSHIP MANAGEMENT

Relationship Management involves the need to maintain existing, and establish new relationships, both inside and outside of the e-Gov initiatives, that will reinforce the ability of the PMO to deliver business value. These relationships include, but are not limited to:

- Initiatives external to E-Government but within MoPT
- Ministries other than MoPT
- Sub-Contractors
- Project Management Delivery
- Funding Agencies

COMPETENCY MANAGEMENT

Project management is a critical capability. The e-Gov PMO will provide input to project management thought leadership for the development of programs throughout e-Government.

BUSINESS BENEFITS OF THE PMO

- Improve delivery of internal projects
- Accurate, revealing, and usable metrics on the state of e-Gov projects as a business management insight tool for e-Gov management
- Improved organizational maturity around the project management discipline
- Vehicle for issue escalation and resolution
- Vehicle for risk assessment and mitigation
- Consistent data and central repository for oversight of project activities at all levels
- Summary of project information that can be leveraged into higher level reporting (i.e. Service Excellence)
- Identification of _high risk' projects before they become problem situations
- Trending and common causes analyses so that management can make sound decisions based upon _actual data'
- Elimination of redundancies by integrating with other PMOs
- Sharing of lessons learned
- Evolution of common standards and tools
- Single focal point for e-Gov project support related activities:
- Project Plans/Schedules
- Status reports
- Management Summary reporting
- CR Repository
- Value Assurance Review:

- Coordination
- Preparation
- Coaching/Mentoring
- Templates
- Review criteria and Leverage
- Action for support

PMO CRITICAL SUCCESS FACTORS

- **Resources and budget** to support the PMO implementation and on going operations must be obtained
- **e-Gov Management** will actively participate in the success of projects
- **The business value** of the PMO‘s products and services to all of e-Gov must be successfully communicated
- **Project management processes** must be flexible enough to accommodate end customer demands and rigorous enough to drive discipline
- Roles and responsibilities must be clearly defined
- **Consistent reporting** requirements from leadership
- Accuracy and timeliness of project reporting
- **Participation** of all project teams
- **Processes, reports, and work products** from existing project offices will be leveraged

ANNEX 7: GUIDELINES FOR PROCUREMENT OF COMMON REQUIRED SOFTWARE PACKAGES

GOVERNMENT ACCOUNTING SOFTWARE

The following features is required in any accounting software that a government Ministry/Agency decide to procure, it is recommended that such features to be added in the technical specifications for the accounting software.

ACCOUNTS PAYABLE

- Track checks, purchase orders, and invoices for each vendor
- Set budget warnings for invoice entry to indicate when account budget has been exceeded
- Manage both discounts earned and discounts not taken
- Utilize cash or accrual accounting method
- Set multiple, user-defined approval limits for invoice approval process
- Create customized checks, letters, and any other forms with built-in forms designer

ACCOUNTS RECEIVABLE

- Complete customer information inquiry and reporting
- Generate user-designed invoices, statements, letters, and delinquent notices
- Automatic penalty and sales tax calculation
- User-defined defaults for quick and accurate data entry
- Flexible billing rate calculation by quantity or flat amounts
- Optional customer deposit tracking

ASSET MANAGEMENT

- Allows tracking by GASB classes
- Tracks mass unit assets easily
- Permits tracking of non-depreciable assets
- Allocate assets to multiple departments
- Organize, classify, and link assets
- Distribute depreciation to the General Ledger based on department allocations

CASH RECEIPTING

- Automated Internet credit card payments
- Comprehensive balancing registers
- User-defined payment categories

- Laborsaving entry corrections and voiding procedures
- Quick receipt entry setup and redisplay options
- Prompt customer information inquiry
- Interfaces with optional module to print endorsement information on checks

GENERAL LEDGER

- Track and report activity costs
- Utilize grant reporting capabilities
- Complete budget tools for preparation and reporting
- Subsystem interface creates journal entries
- Simplified bank reconciliation
- Account inquiry with transaction detail

REQUISITIONS & PURCHASE ORDERS

- Use requisition and purchase order entry screens that are easy to use
- Set budget warnings for purchase order entry to indicate when account budget has been exceeded
- Create either regular or blanket purchase orders
- Tracks both open and closed purchase orders
- Uses simple procedures to close open purchase orders and encumbrance entries in the General Ledger

EASE OF USE, STANDARDIZATION AND INTERFACES

- Custom reporting
- Powerful search options
- Electronic document and image attachments
- Application, task, and field level security
- Print, save, and export all reports (CSV, Excel, PDF and HTML formats)
- History and management tracking

HUMAN RESOURCES MANAGEMENT

The HR System in any ministry and agency should enable the HR Department to manage the information:

Employee Management

- Manage employee‘s basic records and information.
- Residential address, Postal address
- Telephone numbers
- Disabilities
- Marital status
- Tax details
- Banking details
- Medical aid details
- File attachments: This function allow users to browse and upload relevant documents and contracts e.g. employment contract, CV, Identity or passport documents, resignation or termination letters.

Qualifications

The Qualification feature should allows the user to document and update employees educational achievements and development. This module assists the HR Manager with keeping track of external, as well as internal courses completed which in turn can be drawn on when considering specific candidates for promotion or further development.

Medical Aid Dependants

The system should include the ability to record all medical history inceidents of employees, including insurance information.

Leave Management

- The Leave Management Feature should be accessible to both management and employees. Employees can apply for leave online and managers can choose to accept or reject the application.
- User or Admin must be able to setup different types of leave that are used in the organization.
- The Leave History is required to build a history report, based on pre-defined amount of leave days captured into the system for employees

Incident Reporting

HR department must be able to keep track of employee transgression and action taken against a transgression to ensure specific standards are maintained and legal course is taken, should the need arise.

PROCUREMENT GUIDELINES FOR GOL

Reference to Section 2 in this report, the common required software is identified within each ministry and agency in the Government of Liberia.

It is highly recommended to classify each of the ministries and agencies to the following classes:

1. Number of Employees:
    a) Less than 100
    b) Between 100 and 500
    c) Between 500 and 1000
    d) More than 1000
2. Type of business
    a) Financial related (MoF, GSA, PPCC, LPRC, NPA, …)
    b) Planning, Regulatory, and Policy makers (MPEA, MoPT, LTA, GAC,MICAT…)
    c) Service Providers and development (MoE, MoH, MoA, FDA, MoPW,MLME…)
3. Relation with other ministries
    a) Service consumer (MOH, MoE, MoA, NPA)
    b) Service Provider (MoF, MPEA, MoS)

Based on This Classification:

Procurement of HR systems in GOL Ministries and Agencies should be grouped by the number of employee‘s classification.

Procurement of Accounting Software should be based on the Type of business classification

Procurement of networking Hardware and servers should be based on Relation with other ministries

- Service providers need expensive and standard setup of servers and connectivity
- Service consumers require only internet connection to access the services provided by service providers‘ ministries.

For more information, please visit
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